ISTANBUL TECHNICAL UNIVERSITY ★ INSTITUTE OF SCIENCE AND TECHNOLOGY

WAYS TO PREVENT OFFICE BUILDINGS FROM GETTING OBSOLETE: A DECISION-TREE APPROACH

Ph.D. Thesis by

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Programme: Construction Science

AUGUST 2006

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OFİS BİNALARININ FAYDALI ÖMÜRLERİ SÜRESİNCE ESKİMELERİNİ ÖNLEMENİN YOLLARI: BİR KARAR AĞACI YAKLAŞIMI

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FOREWORD

This research would not be possible without certain people that I have the privilege of knowing.

First of all, without my dear family's support, my father Nazmi Civan, my mother Gülten Civan and my sister Umutay Civan, I would not be able to come this far in my education. Their dedication, never-ending love and support were vital during this tedious process.

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Ağustos 2006 Işılay Civan

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ABBREVIATIONS

SPSS Dataset Encoding

No	:	Office use related case number
History	:	Historical significance
Statecod	:	Location by state
Olduse	:	Original / Old use
Newuse	:	Converted / New use
Consyear	:	Year of construction
Consyrg	:	Year of construction (range)
Coyear	:	Year of conversion
Coyrg	:	Year of conversion (range)
Age	:	Age of the building
Agerg	:	Age of building (range)
Gareasm	:	Gross area (square meter)
Garearg	:	Gross area (square meter - range)
Acqtype	:	Building acquisition type
Acqcosta	:	Building acquisition cost ($, adjusted)
Acqcrg	:	Building acquisition cost ($, adjusted - range)
Decosta	:	Approximate redevelopment cost ($, adjusted)
Decostrg	:	Approximate redevelopment cost ($, adjusted - range)
Costsma	:	Cost per square meter ($, adjusted)
Costsmrg	:	Cost per square meter ($, adjusted - range)
Financco	:	Source of financing
Rentsma	:	Rent per square meter ($, adjusted)
Rentcod	:	Rent per square meter ($, adjusted - range)
Extresto	:	Exterior restoration
Newext	:	New exterior construction
Structur	:	Structural
Mechanic	:	Mechanical
Intdem	:	Interior demolition
Newint	:	New interior construction
Environ	:	Environmental remediation
Landscap	:	Landscaping
Newfac	:	New facilities, parking
Siterest	:	Site restoration
Filter_r	:	Filtering according to renovation
Filterao	:	Filtering according to adaptive reuse (to office)
Filteroa	:	Filtering according to adaptive reuse (from office)
Filter3	:	Filtering according to renovation and adaptive reuse (both)
Rework	:	Weighted average of restoration work
Newwork	:	Weighted average of new construction work
Outwork	:	Weighted average of out-of-the-building work
Allpwork	:	Weighted average of all physical work

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WAYS TO PREVENT OFFICE BUILDINGS FROM GETTING OBSOLETE:

A DECISION-TREE APPROACH

SUMMARY

Office buildings are one of the major assets of companies enabling them to maintain their competitive advantage. Successful and effective facility management of corporate assets means highly efficient personnel, which translates into minimum cost and maximum profit. Preventing office buildings from getting obsolete, adaptability to change and emerging technologies protects organizations from foreseeable and excessive costs. Facilities are the infrastructure that support people, either individually or collectively, in realizing their goals and requires ongoing management if they are to remain aligned with their intended and primary support function. All of these facts demonstrate the indisputably important role that facilities play in corporate success. Thus, in this study, the problems that corporate buildings encounter in time and solutions for these problems are analyzed through numerous cases and systematized under certain categories. Next, a decision-tree that is integrated on a timeline is proposed based on the previously formed categories.

OFİS BİNALARININ FAYDALI ÖMÜRLERİ SÜRESİNCE ESKİMELERİNİ ÖNLEMENİN YOLLARI: KARAR AĞACI YAKLAŞIMI

ÖZET

Ofis binaları, işletmelerin rekabetsel avantajlarını koruyabilmelerini sağlayan en önemli firma kaynaklarından biridir. Etkin ve efektif bina işletmesi/yönetimi, işletmeler için yüksek verimde çalışan personel, dolayısıyla minimum maliyet ve maksimum kazanç demektir. Ofis binalarının fonksiyonel eskimeden korunması, değişim ve yeniliklere uyumu, organizasyonel bazda işletmelerin de öngörülebilir ve azaltılabilir yüksek maliyetlerden korunmalarını sağlar. Ofis binalarının temel görevi olan organizasyon çalışanlarını işletmenin amaçları doğrultusunda destekleme görevini en iyi şekilde yerine getirebilmesi ancak, değişim ve yeniliklere uyumlu olacak şekilde işletilmesi ile mümkündür. Tüm bunlar göz önüne alındığında işletmelerin sahip oldukları yada kiraladıkları binalarının, işletmenin başarısında çok önemli bir rol oynadığı görülmektedir. Bu sebeple, bu çalışmada, çeşitli firmaların zamanla binalarında yaşadıkları problemler ve bu problemlerin çözümlerinin neler olabileceği değişik vakalarla analiz edilerek değerlendirilmiş ve bir kaç ana başlık altında sistematize edilmeye calışılmıştır. Bu sistematik analizin akabinde, oluşturulan ana başlıklar doğrultusunda, ofis binalarının işletilmesine ilişkin zaman çizelgesi üzerine oturtulmuş öneri bir karar ağacı oluşturulmuştur.

1. INTRODUCTION

1.1 General Problem

In today's work environment, the competitiveness of an organization is directly related with how effectively and efficiently a business manages its resources. Corporate real estate assets (land and buildings used for workspace, infrastructure and investment) are termed as the fifth resource, after the traditional resources people, technology, information and capital (Joroff et al., 1993). In addition, for many organizations, facilities-related costs are second only to the cost of labor (salaries) (McGregor & Then, 1999).

Although these two characteristics should convince the companies that judicious management of their real estate assets is a major factor -especially if they are seeking to maintain a competitive advantage-, expenditures on these buildings are generally regarded as a 'sunk' business cost, which cannot be avoided. The prevailing view is that the level of management associated with controlling facilities-related costs is not sufficiently demanding or sophisticated enough to necessitate the skills of a specialist or the attention of the business's senior executives (McGregor & Then, 1999).

However, the companies that want to preserve their competitive edge in the market are beginning to see the importance of treating their corporate real estate as an asset. They recognize that facilities are the infrastructure that supports the people in the organization in their endeavors to achieve business goals. In other words, they are well aware that facilities are the tools which people in the business have at their disposal to carry out their tasks. Failure to accomplish facilitating these business goals imposes heavy burdens on the organization and its users. These burdens may include lost productivity of people and activities housed in and served by the facility, increased operating costs to overcome the mismatch of needs and facility capability, or increased worker absenteeism and health care costs related to on-the-job stress (Iselin & Lemer, 1993).

Furthermore, the goals of users or owners may change, leading to requirements different from those the facility was initially intended to fulfill. Many of the technologies of modern facilities, as well as the activities they shelter and support, have changed substantially in recent decades and are continuing to change. These changes lead to rising expectations about the services and amenities a facility should provide. Rising expectations can effectively shorten the useful life of a facility and are the essential characteristics of obsolescence. Accommodating rising expectations is often costly, but failing to accommodate change is costly as well. Obsolete facilities – antiquated, old fashioned, and out of date – can impose heavy burdens on their owners and users (Iselin & Lemer, 1993).

Consequently, land and facilities are required to fulfill two critical roles supporting the work of the organization and the realization of its competitive strategy. The first role is to physically support the production process. Real estate provides a central place for people to gather and work to be done. The second role is the symbolic representation of the organization to the world. The physical setting of the organization is seen by its employees, customers, and suppliers as the embodiment of the company's values and goals. A sound corporate real estate strategy harnesses both the logistical and symbolic power of workplace and puts it to work to complement the competitive strategy (O'Mara, 1999). This study's aim is to address both of these dynamics.

1.2 Importance of the Research Problem

Office buildings are typically designed to last for at least 50 – 60 years, and in their initial 15 – 20 years they are expected to serve to the original function they are designed for (McGregor & Then, 1999). Yet, due to the rapid changes in technological advances, office buildings that are 20, 10, even five years old today can be subject to obsolescence (Kiell, 1992). Even new buildings, under certain circumstances, are being renovated to meet the needs of the market before they become inadequate or ineffective due to obsolescence, or turn out to be redundant due to a change in demand for their services (Langston & Lauge-Kristensen, 2002). According to the Association for Commercial Real Estate (Kiell, 1992), it is reasonable to consider almost any property not categorized as part of the market's new-construction stock as an "older building" that is eligible for renovation and/or

conversion. This is a phenomenon that is becoming standard practice for buildings of all ages.

To minimize the impacts of obsolescence, the aging of a facility should be regularly monitored against the possible changes related to the uses a building or certain spaces within the building are expected to serve (i.e., functional); the cost of continuing to use an existing building, subsystem or component in comparison with the expense of substituting some alternative (economic); the efficiency and service offered by the existing installed technology compared with new and improved alternatives (technological); or the broad influence of changing social goals, political agendas, or changing lifestyles (social, legal/political, market) (Kiell, 1992; Iselin & Lemer, 1993; Hutcheson, 1994; Ballesty & Orlovic, 2004 – see appendix A for more definition of terms). Such changes are often embodied in the adoption of new standards or codes, rising expectations of performance, major technological change, major change in functional requirements, major organizational change, shifts in property values, poor maintenance or abuse of systems, or aesthetic shifts (Iselin & Lemer, 1993). These events and shifts spur obsolescence.

Renovating / converting office properties to maximize their value through skillful, limited improvements to public spaces and building systems has become a significant trend in recent years. While renovating / converting is not a new practice, this type of activity has increased since the early 1990s, when owners and investors shifted their focus to the management of existing properties in response to oversupplied markets (Gause, 1998). Many older Class A buildings face big challenges in today's marketplace. They are in competition with newer buildings that have suffered little or no wear and tear, are equipped with state-of-the-art technology, offer flexible space for tenants, and are fully accessible to the handicapped (Gause, 1998).

1.3 Purpose of the Study

The purpose of this study is to develop a decision-tree approach related to when and how to minimize the impacts of office building obsolescence encountered throughout a property's economic life cycle.

1.4 Research Questions

The questions that guide this study are as follows:

- What types of problems do office buildings encounter throughout their economic life cycle?
- What types of solutions are companies commonly implementing?
- Is there a typical solution implementation sequence and/or timeline being followed by the decision-makers?

1.5 Delimitations & Assumptions

- This study's results are limited to the included case studies only. No attempts are made to produce any generalizations and/or develop an overall model that could be applied to all office redevelopment projects. However, the results should highlight the most important and common problems and solutions, in addition to a comprehensive decision-making tree that might be used as a decision aid.
- Every case study gathered is assumed to have accurate information.
- For each case study, it is assumed that the optimal, most economically viable solution to the problem(s) has been explored and presented.

1.6 Significance of the Study & Anticipated Benefits

Although facilities management is commonly accepted as an important field of study, it is unfortunately not yet regarded as a distinct discipline in Turkey. However, it is likely that in the near future, this area of exploration will transform into a body of knowledge on the subject, eventually resulting in a well-defined study area, as is the case for many other countries -primarily USA and UK.

This study is expected to be a useful aid for corporate managers who are aware of the unique status of their corporate real estate. For example, managers who are willing to take one step further to search for different decision criteria and various options to preserve the value of their assets, while maintaining the facilitation capability of their real estate.

1.7 Organization of the Study

To be better equipped to understand the problem at hand, in Chapter II, an extensive review of literature will be conducted, starting from a broader perspective. Initially, in the framework of corporate real estate and business space in general, true meaning and unique characteristics will first be identified. Next, strategic management of corporate real estate and the term 'facility management' will be thoroughly investigated.

Emphasis will then be directed to business climate and change, leading to the driving forces for change and obsolescence in the management of corporate real estate. This will be followed by the introduction of the obsolescence concept, which is arguably the heart of the rehabilitation / conversion processes. Next, the life cycle of a facility and the impact of obsolescence on the building life cycle will be discussed. Finally, methods of minimizing the impacts of obsolescence will be explored to determine the basic requisites for maintaining the value of the real estate as an asset.

In the methodology section, Chapter III, the design of the study and its sample selection process will initially be explained. This will be followed by the elucidation of the data collection and data validation process. Next, data analysis and interpretation of the data will be described. Subsequently, details regarding reliability, and validity issues will be mentioned.

In Chapter IV, results and findings of the study will be summarized, starting with the identification of typically experienced problems, suggested solutions to these problems, and success assessment of the suggested solutions among forty case studies. Next, using a larger set of data (139 cases), additional information including the extent of physical work required, cost and rent per square meter, acquisition and development costs, and acquisition types and financing sources will be analyzed regarding the alternative solution types and various age categories.

In the conclusion section, Chapter V, a timeline integrated decision-tree approach will be proposed using the outcomes of the two datasets. Next, an overall assessment of the approach including its possible strengths and weaknesses will be discussed followed by suggestions for further study areas.

Lastly, the references and appendices sections of the study will be presented respectively.

2. REVIEW OF LITERATURE

2.1 Corporate Real Estate & Business of Space

On the most basic level, an office building generates business activity. It is built and developed to serve the need of contemporary businesses, institutions, governments and individuals for an enclosed space in which to conduct their activities (White, 1993). During the period up to the mid-1970s, office buildings were seen as a necessary, but relatively 'static' factor of production, required to accommodate the production processes of business. Expenditures on these buildings were generally regarded as a 'sunk' business cost that could not be avoided. The prevailing view at that time was that the costs associated with controlling this group of facilities-related costs was not regarded as sufficiently demanding or sophisticated enough to necessitate special skills or the attention of the business's senior executives (McGregor & Then, 1999).

As Sally Zeckhauser and Robert Silverman highlighted in the Harvard Business Review in 1981, corporate real estate – the land and buildings owned by companies not primarily in the real estate business – was an aspect of corporate affairs largely ignored in boardrooms. A survey conducted by Zeckhauser and Silverman found that only 40% of American companies clearly and consistently evaluated the performance of their real estate, 'most treated property as an overhead cost like stationery and paper clips'.

Nevertheless in 2002, Craig Langston and Rima Lauge-Kristensen argued that much has been written about the design, procurement and maintenance of office buildings and other infrastructure, but relatively little about the relationship between these facilities and the business functions they are intended to support. An often under-estimated link, physical assets can affect the productivity of workers and the external image transmitted by the organization to its customers. Creation of facilities that

have a positive influence on productivity and marketing can directly contribute to financial return and the securing of new business opportunities.

Today, almost four decades on, the acceptance by senior management of property assets (real estate) as a vital business resource is still by no means obvious. In many organizations the role of operational property is still considered to be no more than a cost to business, an overhead that does not warrant serious management considerations (McGregor & Then, 1999).

However, business today is a competitive and customer-focused activity that must operate in an environment that is subject to continual change. Being successful means that the business has a clear vision and works towards identified goals while simultaneously improving quality, reducing costs and minimizing risk (Langston & Lauge-Kristensen, 2002).

Because the office building is essential to the operation of modern business, it is partially responsible for the generation of wages and salaries of the workers who work in it. In addition, the office building houses companies that create profit and losses, to which the building contributes in two ways. First, as the locus of the business activity, it directly participates in, and contributes to, the profit or loss generated by the business. Second, its actual design or operation may increase or decrease profit or loss (White, 1993).

While it is important that facilities are well designed, efficiently managed and used to their best advantage, it is more important that they support core business goals by enabling people to be at their most productive. Improvements in worker productivity can lead to financial gains that outweigh facility operating costs such as energy, cleaning, maintenance and the like (Smith, 2002).

Built facilities are typically the places where people work. People are generally the single biggest cost center for any business or organization and its single biggest asset. Having good people means there is capacity, potential, creativity, responsiveness, continuity and a likelihood of success. Keeping people happy and enabling them to be productive in their daily activities is not only critical in gaining and retaining a strong workforce, but also in delivering overall business prosperity and growth (Smith, 2002).

However, the prolonged depression in world trade during the 1970s, and from the mid-1980s onwards, has brought about a renewed awareness in controlling the costs of doing business. For many large corporations, the revelation that after *staff costs (salaries)*, the next highest category of costs are ***facilities-related*** – regardless of whether space is owned or leased, has reinforced the strategic importance of property (or real estate) as a business resource, and the need to manage the resource as effectively and efficiently as possible (McGregor & Then, 1999; Smith, 2002).

This new awareness has brought about a much needed management focus on measures to ensure the corporate real estate portfolio is matched as closely as possible to operational requirements, and that asset occupancy costs are managed and controlled. The perceived role of real estate assets in business and their effective management is increasingly seen as a strategic dimension in business planning (McGregor & Then, 1999).

The significance of the strategic role of real estate assets to corporate performance can be seen in the influential research report by the Industrial Development Research Foundation (Joroff et al., 1993), where corporate real estate assets are termed as the ***fifth resource***, after the traditional resources of *people, technology, information* and *capital*. There is ample evidence (UK & Europe Surveys: Aviz, et al., 1989; Debenham Tewson Research, 1992; Oxford Brookes University & University of Reading, 1993; Ernst & Young, 1993; Graham Bannock & Partners Ltd., 1994; Avis et al., 1995; Gallup, 1996; Milliken Carpet, 1996; Andersen, 1995; U.S.A Surveys: Zeckhauser & Silverman, 1981; Veale, 1987; Andersen, 1993; Joroff, M. et al., 1993) to support the view that an assured strategic direction is needed from senior business managers, in their consideration of the management of corporate real estate as an integral part of business resource management (see Appendix B for survey summaries).

2.2 Strategic Management of Corporate Real Estate & Facility Management

Before considering the management of facilities, it is necessary to determine what the term ‘facilities’ mean. It is preferable to consider facilities as *infrastructure* that supports people, either individually or collectively, in realizing their goals and requires ongoing management if they are to remain aligned with their intended

support function. Facility management is therefore about empowering people through provision of infrastructure that adds value to the processes they support (Smith, 2002).

Facility management concerns people and places. The term 'facilities (or facility) management' has gained widespread use in North America and the UK, has been progressively adopted in Europe and, most recently, in Australia, New Zealand and the Far East. Yet there is no consistent definition of its scope of activities. The United States Library of Congress provides an initial definition that is often quoted to explain the breadth of the field of facilities management:

> *"Facilities management is the practice of coordinating the physical workplace with the people and work of the organization; integrates the principles of business administration, architecture and the behavioral and engineering sciences."*

The definition of the International Facility Management Association (IFMA), clearly implies that a major part of the facilities management activities is inextricably tied to the provision and ongoing management of an organization's real estate assets and its facilities-related support services, as a productive working environment:

> *"Facility management is a distinct management function and, as such, involves a well-defined and consistent set of responsibilities. Simply stated, it is management of a vital asset – the organization's facilities… Facility management combines proven management practices with current technical knowledge to provide humane and effective work environments. It is the business practice planning, providing, and managing productive work environments."*

The British Institute of Facilities Management (BIFM) adopts a definition that emphasizes the multidisciplinary role of facilities managers. This definition includes extensive responsibilities for providing, maintaining and developing services ranging from property strategy, space management and communication infrastructure, to building maintenance, administration and contract management.

> "*Facilities Management is the integration of multi-disciplinary activities within the built environment and the management of their impact upon people*

and the workplace. Effective Facilities Management is vital to the success of an organization by contributing to the delivery of its strategic and operational objectives."

The Facility Management Association of Australia (FMAA) emphasizes the importance of an integrative view of people, processes and the physical infrastructure to enhance corporate performance.

"Facility Management is the practice of integrating the management of people and the business process of an organization with the physical infrastructure to enhance corporate performance."

The most important step to put real estate in a strategic context is to accept that real estate is of no value to the corporation, regardless of its economic value in an external real estate market, if the real estate does not support the objectives of the organization. Hence, Martha A. O'Mara (1999) argues that the decisions that will be made about the facility and its daily management must emphasize maximizing its value in helping the organization to compete and thrive.

O'Mara (1999) also claims that classic measures of real estate performance such as return on equity or internal rate of return, or even measures of asset utilization such as return on capital employed, only measure real estate's effectiveness in past terms. Those methods use metrics relating only to currently established lines of business – how the world used to work. It is much harder to quantify the value of real estate as a competitive advantage for tomorrow's competitive environment. A future orientation requires both vision and a belief that real estate and facilities do matter.

Real estate and facilities fulfill two critical roles in supporting the work of the organization and the realization of its competitive strategy. The first role is to physically support the production process. Real estate provides a central place for people to gather and for work to be done. The second role is the symbolic representation of the organization to the world. The physical setting of the organization is seen by its employees, customers, and suppliers as the embodiment of the company's values and goals. A sound corporate real estate strategy harnesses both the logistical and symbolic power of workplace and puts it to work to

complement the competitive strategy (O'Mara, 1999). This study's aim is to address both of these dynamics.

While it is true that no real estate or facility strategy, no matter how well delivered, can ever compensate for an inferior product or poor customer service, real estate and facilities play an important role as enablers of strategic actions. Enablers are those things which help get the product out the door better, faster, or with less cost. They support the people who do the work and provide an environment where innovation flourishes and common goals are well understood (O'Mara, 1999).

2.3 Business Climate & Change

As Wes McGregor and Danny Shiem-Shin Then (1999) emphasize, the desired outcome in any organization, from perspective of business operations is to maintain strategic relevance by attempting continuously to match business demand for workplace with the existing real estate portfolio (the supply). This is carried out through the provision of appropriate enabling work environments that satisfy the needs of the people in the business and their work processes.

There are three forces, separately and in combination, which are accepted as driving forces behind today's companies: Customers, Competition, and Change. Rapid technological development, particularly in computing and telecommunications, has rendered many buildings either prematurely obsolete or in need of high capital investment for modernization. In essence, there is a need for organizations to continuously reappraise their real estate and workplace strategies to ensure their alignment to changing business drivers and operational requirements (McGregor & Then, 1999).

Technology involves communication and information equipment and its support, software tools and data management. Once thought to be a separate area of expertise, it is now becoming so germane to the way in which people work that it not only affects facilities but also can substitute for them. A focus on performance, constant change, and upgrade, and the need for timely support has led to a close connection between facilities and the availability of technology as an integrated approach to their management. People can now work remotely, be mobile, flexible, more in

control and hence more efficient, often leading to increased job satisfaction as well as less reliance on dedicated workspace (Smith, 2002).

The pace of change brought on by intense global competition and rapid technological developments has, in recent years, meant that the past assumptions of stability and steady growth are no longer true. These changes have particular significance for the ongoing management of operational property and premises occupancy costs. A key feature within any organization is the ability to respond to shifts in the strategic direction of the business. While so doing, the organization can control the likely impact upon the existing real estate portfolio, in terms of the amount of space, i.e. the scale of the assets, as well as the financial consequences of its ownership and occupation. Essential prerequisites for this to be achieved are appropriate strategies for both facilities and support services that are continuously aligned with the strategic intentions of the business (McGregor & Then, 1999).

2.3.1 Maturation Stage of Organizations

A company's approach to real estate decision-making will change over time as its competitive demands change. Factors which influence uncertainty such as growth or contraction of the business, new markets or competitors, mergers or acquisitions, or changes in the use of technology will trigger a shift in how real estate and facility decisions are made.

As Harvey H. Kaiser (1989) discusses, every organization goes through the following stages: Initial, Growing, Stable, Aging, and Declining (Figure 2.1). In each stage, economic impacts are examined and various facility management strategies applied.

Growth in the organization occurs on a vertical axis while time is plotted on a horizontal axis. In the initial stages of an organization's development, leasing space is followed by decisions to either buy or build space. This is a critical stage for strategic planning of facility management alternatives. A stable organization may be undergoing some expansion, and replacement of existing space may also occur. The aging organization faces choices of replacing obsolete facilities and major building components or demolishing facilities. In a declining stage, decisions must be made

for consolidating space by selling or leasing owned space, terminating leases, and/or demolishing marginally used facilities.

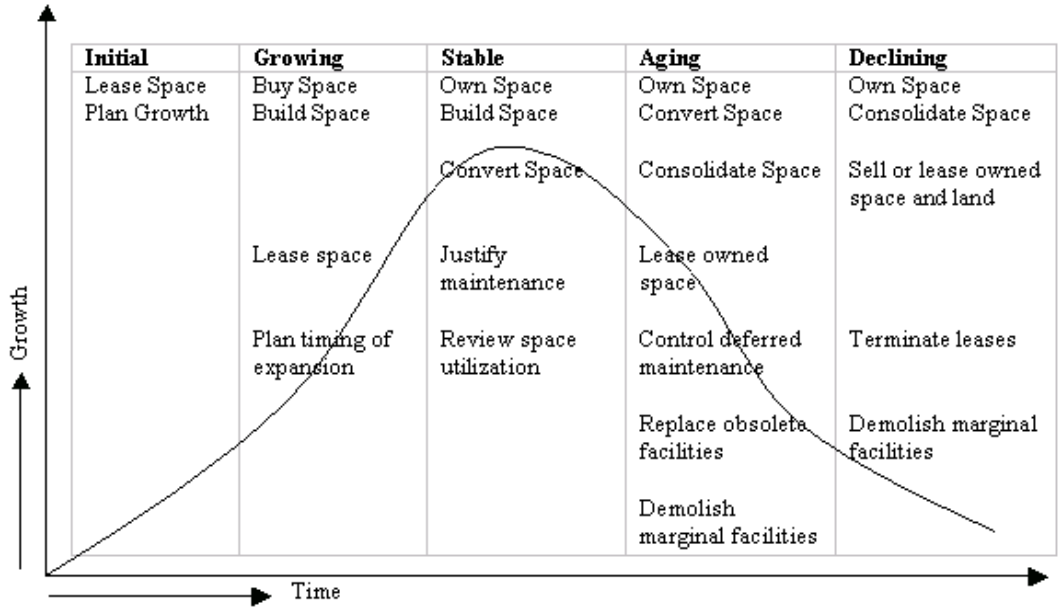

Figure 2.1: Facility Management & Organizational Stage of Maturity

2.3.2 Workspace Change

Workspace mix can be examined within the context of five major categories, including remote, group, support, open plan and cellular type designs (McGregor & Then, 1999). As can be seen from Figure 2.2, over the years the mix of workspace has significantly changed. In 1950s, primarily cellular type designs were being used, accompanied by support, and open plan designs. In 1960s and 1970s, although the preferred workspace designs remained the same, their percentages in the mix had extensively changed.

In 1980s, group type was included in the mix of workspace. This was followed by the remote type of design, first introduced in 1990s, although neither factor played a crucial part in the mix at that time. However in the 21st century all five types of workspace designs hold a similar weight in the mix. Thus, any space-related issues and/or requirements should take these changing mix of workspace over time into account to retain a competitive edge and to prevent the corporate real estate from becoming obsolete.

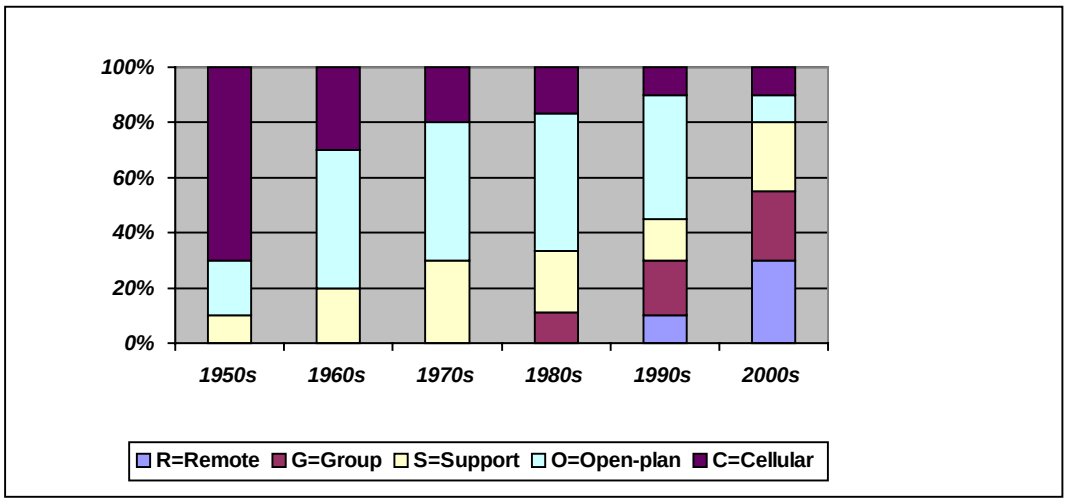

Figure 2.2: The Changing Mix of Workspace

2.3.3 Organizational Structure Change

In a review of the potential impact of current management thinking on organization structures and the design of the workplace, Duffy and Tanis (1993) succinctly placed in context some of the main emerging management themes from the current group of 'new management gurus' (Byrne, 1992). This was carried out by mapping their implications on the contents of work and the patterns of space use within office buildings, as can be seen in Table 2.1.

Table 2.1: Organizational Change and its impact on the physical workplace

The Impact of New Organization Structures on the Workplace (Duffy & Tanis, 1993)	New Ways of Working	More interaction •	More collaboration •	More individual autonomy •	New Patterns of Space Use	More group spaces •	More shared spaces •	More intermittent space use •
Michael Hammer: 'Re-engineering'		X	X			X	X	
George Stalk: 'Time-based Competition'							X	X
David Nalder: ' New Organizational Architecture'		X	X			X		
Peter Senge: 'The Learning Organization'		X	X	X			X	
Charles Handy: 'Discontinuous Change'				X				X
Edward Lawler: 'High-Performance Involvement'		X	X			X	X	
Prahalad & Hamel: 'Core Competencies'		X	X			X	X	
Gerald Ross: 'New Molecular Organization'			X			X	X	
Shoshana Zuboff: 'Informating'		X	X	X		X	X	

This vision of the new workplace, set against a period of accelerating change and intensifying global competition, demands a strategic rethink at corporate level, about the way work is done and the workplace being provided. Ultimately, employees' rising expectations of their work environment, coupled with costly and lengthy commuting time to work, are factors that businesses can no longer ignore. As a result, this suggests that investments in functional space and technology must be integrated into the strategic modeling of the business, its processes and its varying demands for services and facilities (McGregor & Then, 1999).

2.4 Driving Forces for Change & Obsolescence in the Management of Corporate Real Estate & Facilities

The professions of corporate real estate and facility management have greatly evolved over the past twenty-five years. As partially discussed earlier, six major sources of change are driving the transformation of the corporate real estate profession: the globalization of customers and competitors, radical advances in computers and communication, lifestyle and demographic changes, changes in the corporate form, changes in the external real estate environment, and overall, increasingly rapid rates of change in society at large (Muhlebach & Alexander, 1998; O'Mara, 1999).

Furthermore, issues like overbuilding, increased competition in attracting and retaining tenants, existing and prospective tenants with greater sophistication and higher expectations, which all gained prominence in the 1980s, have created a climate that defined commercial real estate in the 1990s. In this environment, developers, owners, and property managers recognize that their properties must stay attractive and efficient to remain competitive – a property's image must be fresh and appealing, its systems must be up-to-date and efficient, and its structures must be sound and safe. The steps that may be taken to address image, systems, and structures run the gamut, from cosmetic changes that may involve little more than a few gallons of paint to multimillion-dollar, multi-year transformations that involve gutting a building to its barest structure (Kiell, 1992).

Sometimes the motivation for such action comes primarily from outside sources. Users or owners may change and have requirements different from those the facility

was initially intended to fulfill. Many of the technologies of modern facilities, as well as the activities they shelter and support, have changed substantially in recent decades and are continuing to change. These changes lead to rising expectations about the services and amenities a facility should provide. Rising expectations can effectively shorten the lifetime of a facility and are the essential characteristics of obsolescence. Accommodating rising expectations often has been costly, but failing to accommodate change is costly as well, for obsolete facilities – antiquated, old fashioned, and out of date – can impose heavy burdens on their owners and users. These burdens may include lost productivity of people and activities housed and served by the facility, increased operating costs to overcome the mismatch of needs and facility capability, or increased worker absenteeism and health care costs related to on-the-job stress (Iselin & Lemer, 1993).

Iselin and Lemer (1993) further argue that many professionals seemingly use the term "obsolescence" whenever they judge that substantial action is needed to return a facility to full service, and they do not distinguish among the factors giving rise to this need. Yet, new facility uses and their new demands; new materials, technology, and procedures of construction and operation; new air pollutants; and new laws and regulations exemplify changes that lead us to alter design methods and expectations of acceptable service long before older facilities are abandoned. Similarly, changes in organizations, variations in urban real estate markets, and the opportunities presented by new equipment and materials often lead us to renovate long before facilities and their parts are worn out. That we can accommodate change and yet retain at least some portion of the investment of capital, history, and culture embodied in our facilities is a great benefit.

2.4.1 Obsolescence

The ancient Roman designer Vitruvius advised that architecture should be possessed with "Firmness, Commodity and Delight," that is, well constructed, responsive to the functions the owners intend, and pleasing to the eye. This remains sage counsel today. Successful buildings and other facilities operate not only in the three spatial dimensions; the fourth dimension –time– is crucial as well. Facilities are valuable assets that can provide decades of high-quality service if they are used effectively. Facilities are planned, designed, constructed, operated, and maintained to this end.

Nevertheless, a time comes – perhaps through normal wear, poor workmanship, or overloads – when major action is needed to overhaul, renovate, or even demolish a facility no longer providing satisfactory service (Iselin & Lemer, 1993).

Obsolescence is not a matter of design alone but must be considered within the context of a facility's entire life cycle, from initial planning through operations and maintenance. Occurring primarily as a result of external changes, such as the introduction of new technology, neighborhood deterioration, or shifts in public demand for services and amenities, obsolescence reflects changed expectations regarding the shelter, function, comfort, profitability, or other dimensions of performance a facility is expected to provide. These changes generally are (Kiell, 1992; Iselin & Lemer, 1993; Hutcheson, 1994; Ballesty & Orlovic, 2004):

1. Physical: The physical life of a facility is the period from construction to the time when it is physically derelict. Physical obsolescence occurs when the structure collapses or is in danger of collapsing. In reality, most buildings never reach this point, as they are demolished or refurbished for other reasons.

2. Economic: The economic life of a facility is the point of time at which continued occupation of a facility is considered to be the least cost effective option. Economic obsolescence occurs when costs exceed revenue.

3. Functional: The functional life of a facility is the period from occupation to when it ceases to be functionally efficient or 'fit for purpose'. Functional obsolescence is a facet of design. Functional and economic obsolescence are often closely related.

4. Technological: This occurs when a facility or its components are no longer technologically superior to alternatives and replacement is undertaken because of expected lower operating costs or great efficiency. Technological obsolescence occurs when the building is inferior to alternatives.

5. Social: Community values and fashion can lead to the need for facility renovation or replacement, such as environmental and social concerns, which

give rise to the obsolescence of processes and products. Social obsolescence means that the building fails to meet long-term human desires.

6. Legal / Political: Revised safety regulations, facility standards, compliance issues or emerging case law may lead to legal obsolescence. Legal obsolescence is caused by changes in statute.

7. Market: The most recent guidepost is market obsolescence, which may be encountered far earlier. The management strategy in addressing market obsolescence is to be proactive: Fix it before it's broke; improve it before it's passé. Operational isn't enough; state-of-the-art is required.

All these forms of obsolescence can be foreseen by the astute investor through systematic and comprehensive building surveys (Hutcheson, 1994). Only then can available options be evaluated to determine the best possible option and prolong the corporate asset's economic life before it is too late.

2.4.2 The Building Life Cycle

The life of an asset is generally thought to be equal to its economic life. This is the period of time during which the asset is able to make a positive contribution to the financial position of its owners, both present and future (Ballesty & Orlovic, 2004).

The phases of a facility life cycle are as follows (Smith et al., 2001):

- Definition of need: Documenting specifically how an existing facility no longer serves as an optimally functional space for the intended use, and understanding the reasons (e.g., short-comings or functional failures). Additionally understanding the requirements of a new way of doing business and what those requirements will be as they relate to the future use of the building. (This phase is often combined with the program phase into one large phase.)

- Program: A set of owner/occupant-defined guidelines or specifications that reflect how the needs defined in the previous phase can be met by a facility. A designer uses these guidelines to set goals with which to guide the process of designing a facility.

- Design: The collaborative, creative process that produces a set of documented instructions, both written and diagrammed, that address the program requirements and are used to build a new facility or renovate an existing one.

- Build: Procuring, expediting, and constructing the building components to produce the physical entity that was specified in the design phase.

- Operate/maintain: The process and time period when the owner-occupant is using the building for its intended use and is carrying out regular necessary maintenance.

- Decision-phase: The analysis of options leading to a decision to renovate a facility or choose the "end-of-useful life" option. This phase is reached when the overall cost of using a building equals or exceeds the value received from the occupancy or the value of building a new facility in its place. This decision requires reentry into the facility life cycle, either through a total renovation of the existing facility or construction of a new one.

These phases and their associated costs make up the life cycle of a component of a specific building, a group of components of a building system, a facility as a whole, a group of facilities that comprise a campus, or a group of facilities scattered on sites across the globe that is owned and operated by a single organization.

In this study, the emphasis will be given to the last two phases of the facility life cycle, operate/maintain and decision phases respectively. A further elaboration on the possibilities will be explored and diagrammed to be used as a decision aid for the corporate real estate managers.

2.4.3 Impact of Obsolescence on the Building Life Cycle

"Performance," meaning the facility's ability to provide the shelter and service for which it is intended, can be measured by any of a variety of parameters, depending on the particular facility type or subsystem being considered. Measures also include financial, economic, or sociological factors. Figure 2.3 illustrates conceptually the progression of a facility's performance during its service life, which is basically the stage following completion of construction (Iselin & Lemer, 1993).

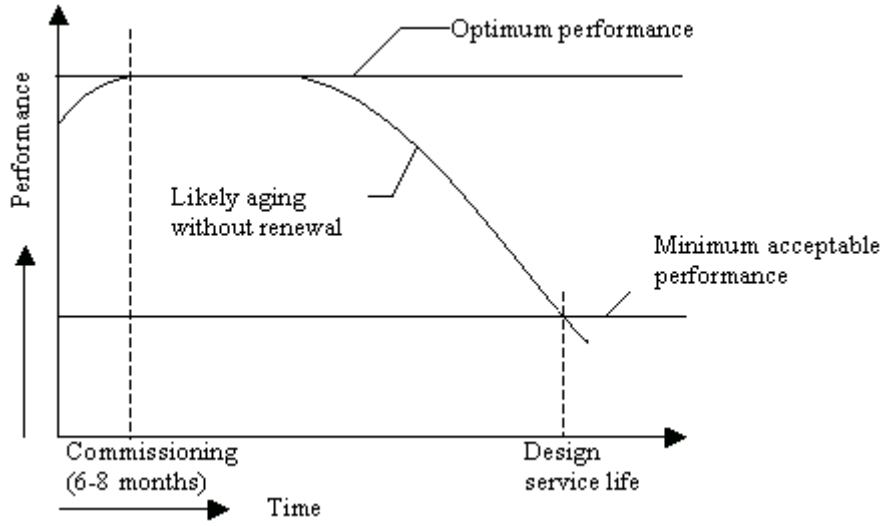

Figure 2.3: A conceptual view of service life

As shown in Figure 2.3, performance at initial occupancy – the facility's initial capability – is typically less than the design ideal. Generally, a modest "shakedown or "shakeout" period of time is necessary for the building, subsystem, or component – and its operational personnel – to reach this anticipated optimum level of performance. Careful commissioning of new facilities can help assure that much of this shakeout is accomplished prior to occupancy. Problems unresolved in the shakedown period or a design that fits poorly with the user's needs will be reflected in a peak performance level below an optimum that might otherwise have been achieved.

Assuming that the facility's initial capability does approach the optimum peak performance, the new facility will continue to deliver that performance, barring catastrophe and with proper operations and normal maintenance, at a reasonably steady level for some years. But there inevitably begins a slow decline owing to wear, aging and functional change. Eventually, performance falls to a level that users judge to be the minimum acceptable. Because of the performance drop, the users may move, owners may take action to renovate their facilities, or the facilities may be demolished and replaced.

If maintenance is deferred or conditions of use are more demanding than anticipated during design, performance deterioration may proceed more rapidly than expected.

As Figure 2.4 illustrates, this deterioration is indicated by a steeper decline in the performance curve, and the minimum acceptable performance is reached sooner.

Thus, the service life is reduced. Such a reduction in service life – below design levels – is typically judged as a failure by users or owners, although sometimes a maintenance effort above "normal" levels can extend the service life beyond its design target.

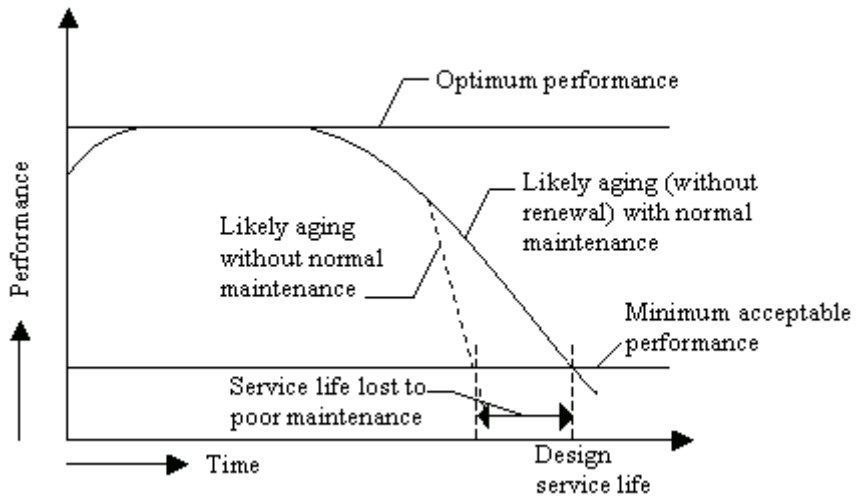

Figure 2.4: Maintenance practices can influence service life

However, as discussed earlier, unchanging levels of optimum and/or minimum acceptable performance over the period of the facility's service life is seldom the case in practice, except perhaps regarding a few basic aspects of performance, such as structural stability and shelter from inclement weather. More typically, users' and owners' expectations change over time as a result of the development of newer facilities, the introduction of new products, and increased experience (see Figure 2.5). As the market competition gets stiffer, it becomes more challenging for companies to meet for the increasing expectations.

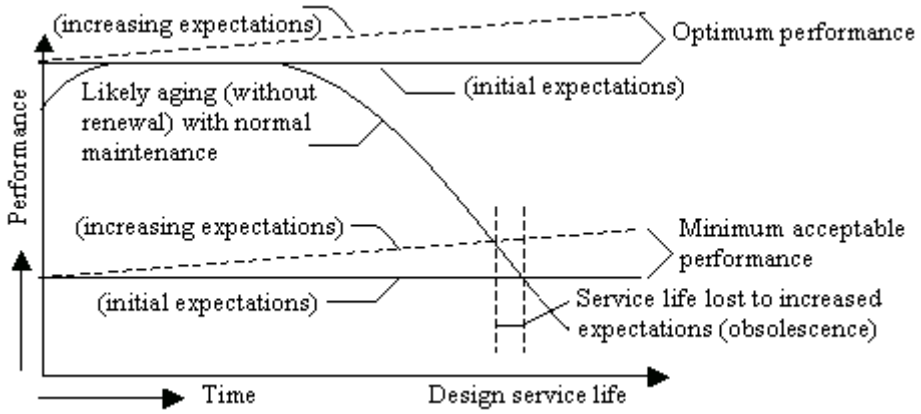

Figure 2.5: Change in standards or expectations of performance with time

Shortening of the service life because of rising expectations is the essential characteristic of obsolescence. As previously discussed, there are seven factors – physical, economic, functional, technological, social, legal and market – that may cause rising expectations, obsolescence, and increased expenses. One of the options for prolonging the service life of a facility is rehabilitation or renewal. Figure 2.6 illustrates how these renewals raise performance level and extend service life.

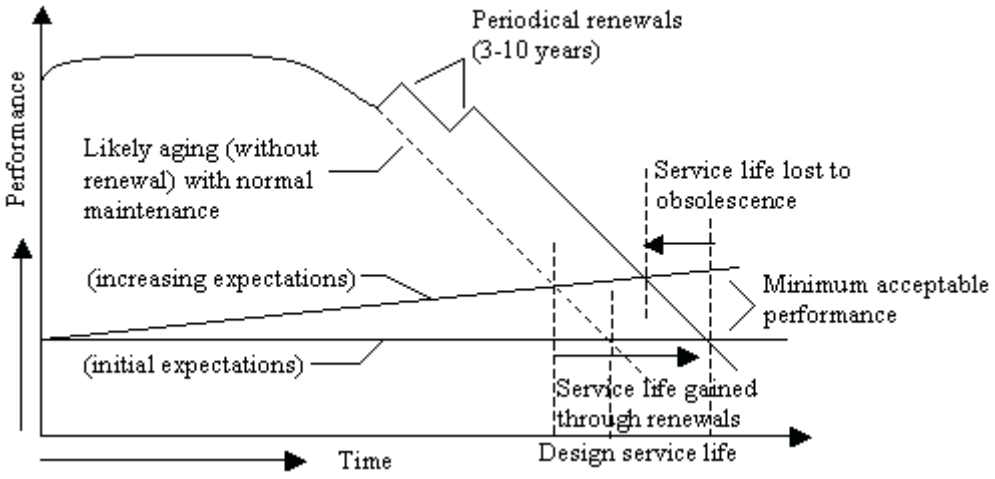

Figure 2.6: Prolonging the service life of a facility

2.4.4 Ways to Minimize the Impact of Obsolescence & to Prolong the Building's Economic Life

Many older Class A buildings face major challenges in today's marketplace. They are in competition with newer buildings that have suffered little or no wear and tear,

are equipped with state-of-the-art technology, offer flexible space for tenants, and are fully accessible to the handicapped (Gause, 1998). Management action to avoid or delay obsolescence becomes critical from a practical standpoint in the facilities operations and maintenance stages of the life cycle. In these stages, the owner and user can act to identify external changes that may signal the onset of obsolescence, while at the same time operating and maintaining the facility to achieve performance according to design intent (Iselin & Lemer, 1993).

Renovating/converting office properties to maximize their value through skillful, limited improvements to public spaces and building systems has become an important trend in recent years. While repositioning is not a new practice, this type of activity has increased since the early 1990s, when owners and investors shifted their focus to the management of existing properties in response to oversupplied markets (Gause, 1998). The following remarks pertain to decisions regarding when and how to reposition a property.

The need to conserve, and often convert, the current stock of historically and architecturally significant buildings to economic and market-rate uses has risen sharply as the supply of public and quasi-public uses, such as museums and private foundations, has dwindled. More than ever before, real estate developers are required to consider the social, economic, and environmental consequences of proposed new construction in areas surrounding the development project. These factors can add further “costs” to the development process, creating a special interest in the adaptive use of existing buildings. Strong reuse potential has been recognized in buildings which have distinctive physical and locational characteristics, and which appear to be economically viable projects. With creative development goals and financial support from the community, reuse of such properties can be an attractive option, not only to developers but also to property owners, preservationists, and public and quasi-public groups (ULI, 1978).

How much work is being done on existing corporate real estate today? Precise figures are likely impossible to ascertain. Yet, all of the sources agree that, in dollars spent, work on existing buildings is as expensive as new construction. Moreover, the trend toward redevelopment is intensifying more and more (Kiell, 1992).

Surveys by Buildings magazine found that, in 1988, $57 billion were being spent annually in the United States for new construction, whereas $64 billion were spent on modernization. In 1991, the figures were $67.7 billion and $57.7 billion on existing buildings and new construction, respectively. “Modernization – the name of the game in today’s competitive commercial buildings industry,” was the headline in their 1988 analysis. In 1991 they added, “Modernization has become ‘the new construction market of the 1990s’ (Kiell, 1992)”.

Building Operating Management magazine queried readers in 1991 and produced similar findings. They reported that 52.3 percent, or $79.4 billion, of the total projected 1991 construction expenditures were devoted to renovation; $72.4 billion, or 47.7 percent, was spent on new construction. The magazine’s survey, in asking the readers for their major reasons for work on their existing facilities, revealed the following (Kiell, 1992):

- modernization 62.4 %
- conversion to new use 30.3 %
- energy conservation 18.9 %
- code compliance 14.7 %
- tenant change 14.2 %

In the 1980s, a combination of economic and social factors increased the attractiveness of renovating existing buildings as opposed to pursuing new construction (Kiell, 1992):

- Building costs increased.
- Long time frames were involved in new construction versus shorter times in the typical renovation.
- New-construction development became a far more complex enterprise. In places such as San Francisco, with the inauguration of their Downtown Plan, no-growth or limited-growth initiatives placed roadblocks to new construction, which made renovation all the more important to sustain and

even increase the supply of quality space to meet the office and industrial requirements of businesses.

- Stricter financing parameters were imposed by lending institutions.

- A heightened sense of historic preservation, combined with a greater premium being placed on conservation and recycling, created positive selling points for those marketing existing properties.

- Older buildings needed to be upgraded to compete with the many new buildings constructed during the 1980s. Renovation became critical to tenant retention in older buildings and, therefore, to their economic viability.

All of these factors helped add to the already greater level of development risk for new construction. In contrast, an existing building has a track record that makes the risk clearer and more predictable. Additionally, as The Association for Commercial Real Estate emphasizes (Kiell, 1992) the rise of rehab for relatively young properties can be tied to the emergence of two factors in the past decade: computers and marketing.

Technology advanced relatively slowly until the 1980's. A level of technology did not become obsolete for five, even ten, years. Therefore, a building system in a 20-year-old building might have been considered outmoded, inefficient, or slow, and the contrast between systems in existing buildings and those that were being installed in new construction were not strikingly different from one another (Kiell, 1992; Iselin & Lemer, 1993; McGregor & Then, 1999).

The early 1980s marked a time when computers went from being arcane to commonplace. Now, a new generation of computer technology is born every two years, or even less; and in the 1980s most commercial building systems incorporated computerized equipment. Electrical systems that were satisfactory 10 years earlier became woefully inadequate. A 10-year-old elevator system or HVAC system today is four or five generations of technology behind. The 1980's pale in comparison to what the present state of the art can offer (Kiell, 1992; Iselin & Lemer, 1993; McGregor & Then, 1999; O'Mara, 1999).

At the same time – and partially because of the advances in telecommunications – the age of marketing arrived. To stand still in the marketplace, even with a respectable and admired product, no longer works; you have to "blow your horn". But you can't blow your horn and announce yourself without continually striving to keep the product fresh. In commercial real estate, "fresh" means either a new building or a property that has been renovated to meet current tastes, needs, standards, and expectations. These two realities of life had a greater influence in the 1990s and beyond. They signal that renovation is here to stay and can only assume a more important role in commercial real estate (Kiell, 1992; O'Mara, 1999).

The terms used to identify the work being done on an existing building vary from source to source. In fact, more than three-dozen terms that various writers have used in recent years are listed in Table 2.2:

Table 2.2: Terms used to identify the work being done on existing buildings

Adaptive reuse	Redevelopment	Restoration
Conversion	Refurbishment	Retrofit
Enhancement	Rehabilitation	Reuse
Facelift	Re-imaging	Revamping
Modernization	Rejuvenation	Revitalization
Rebuilding	Remarketing	Revival
Reclamation	Re-merchandising	Rework
Reconditioning	Remodeling	Turnaround project
Reconfiguring	Renewal	Updating
Reconstruction	Renovation	Upgrading
Re-creation	Repair	Uplift
Recycling	Replacement	
Redesign	Repositioning	

The need for so many words to describe one action is basically caused by the broadness of the subject activity – ranging from new-vintage properties to historic properties, and from cosmetic to comprehensive – to be captured entirely in one word. Most of the words start with the prefix re– which means to begin anew, and it is not hard to become confused among the definitions. According to the Association for Commercial Real Estate (Kiell, 1992), it is vital to realize that different groups – developers, architects, preservationists, lenders, property owners, tenants, real estate media, or the general public – may employ the same words differently. How these terms are bandied about can create important differences in how a project is carried out and how it is perceived by various players.

The same source argues that if, for instance, one emphasizes *restoration* over *modernization,* the public and media perception, and therefore that of prospective tenants, will lean toward the project's historical value and interest. The attention on how up-to-date specific building systems are will be secondary. A *facelift*, *uplift*, and *refurbishing* gives the perception that the changes are primarily on the surface, and therefore a cosmetic renovation, although they may be quite dramatic. *Reconfiguring*, *redesign*, or *remodeling* suggests that the layout and physical appearance of the building are likely to have been altered significantly (although sometimes this last term is employed as a label for more superficial cosmetic work). If one promotes the project as a *retrofit*, the general perception will be that the renovation work dealt primarily with building systems. *Remarketing*, *re-merchandising*, *re-imaging*, and *repositioning* are, in particular, terms that emphasize the marketing and advertising of a property. *Adaptive reuse* and *conversion* specifically indicate that the structure's use has changed.

For the purpose of this study, only a distinction between the terms "renovation" and "adaptive reuse / conversion" of structures will be made, since there is a clear difference between the end goal of the activity: the former is about retaining a building's original use, while the latter is about finding a viable new use to retain the value of corporate real asset. Following is a more detailed explanation of the two terms.

- The ***renovation*** of a structure refers to the physical upgrading of materials and support systems *while retaining a building's original use*.

    - *Cosmetic renovation:* This type of program includes no work on the actual structure of the building. It focuses on improving image, particularly in public areas. The cost of a cosmetic renovation will usually be less than 10 percent of the value or purchase price of the property. And it will usually require three months to one year.

    - *Significant renovation:* A renovation of this scope might include all of the steps taken in a cosmetic renovation, plus many others that address deterioration or obsolescence in a facility. Major repairs are typically carried out on all building systems – HVAC, electricity, plumbing, and elevators.

The cost is usually in the range of 10-50 percent of the property's value or purchase price. The time frame may be up to two years, especially if it is being undertaken as a phased program in an unoccupied building.

- *Comprehensive renovation:* This type of renovation is often called a "gut rehabilitation". Because of its wide scope – which encompasses all of the steps taken in a significant renovation and far more – it is impossible to achieve in an occupied building. All obsolete building systems – HVAC, electricity, plumbing, elevators, security, et cetera – are replaced, as is the roof. Usually this includes a significant upgrading of electrical service and capacity to meet today's greater needs. The cost of such a radical approach is usually at least 50 percent of the value or purchase price, and can be 100 percent or more and still be economically justified. Two-year time frames are common.

- ***Adaptive use*** is the process by which structurally sound older buildings are developed for economically *viable new uses*. Such buildings may be historically important, architecturally distinctive, or simply underutilized structures which exhibit signs of life under a façade of age and neglect.

In other words, adaptive reuse is the process of changing a building's function to accommodate the changing needs of its users. The benefits of reuse extend far beyond the conservation of our cultural legacy. Old buildings can be economical through tax credits and lower acquisition, demolition and material costs. Available utilities and public services can also lower site preparation costs (Ball, 1999).

Adaptive reuse of buildings conserve natural sources and the energy required to extract, process, and transport building materials. Open space is preserved by avoiding the urban sprawl that accompanies new development, and employment increases due to the fact that rehabilitation is labor-intensive. Overall, the physical and social fabric of the community is strengthened. Adaptive reuse should always be investigated, because it is the highest form of recovery. Adaptive reuse revises the function of a building while preserving the integrity of architectural space. For a building to accommodate change, it must have a functional value as well as a

commodity value. Buildings that offer open spaces and a flexible structural framework have the best potential for reuse (Gause, 1996).

Age is another key distinguishing factor in renovation and/or conversion projects. Therefore, it is useful to segment them into three age categories (Kiell, 1992):

- The historic property: > 50 years
- The middle-aged property: 20 – 50 years
- The new-vintage property: < 20 years

2.5 Project Feasibility Analysis

Project feasibility analysis is the process by which developers and investors assess the economic viability of a prospective office development before they commit to the undertaking (Gause, 1998). Feasibility analysis is not a substitute for the developer's vision, experience, and common sense. However, it is a counterbalance to the storied optimism of developers – a reality test, since it is often this optimism that can shade the unrealistic expectations for a project under consideration.

The process of analyzing the feasibility of a prospective office development has two principal components; ***market analysis*** – *also called market research or market study in some sources* and ***financial feasibility analysis*** – *also called economic study in some sources* (Arnold, 1983; Barret & Blair, 1988; Canestaro, 1989; Freeman, 1987; Etter, 1988; Etter, 1995; Wurtzebach & Miles, 1994; Peiser, 1992; Gause, 1998). Office developers and investors use both market analysis and financial feasibility analysis to identify and evaluate opportunities for constructing new office buildings and for renovating and/or converting existing buildings to attract different segments of the market.

In project feasibility analysis, the market analysis is carried out first, followed by the financial feasibility analysis. In financial feasibility analysis, data collected in the market analysis is used to evaluate the potential profitability of an investment in the proposed development. Just as the market analysis was designed to evaluate the acceptability of the project in a market sense, the financial feasibility analysis will

evaluate the attractiveness of the project in an economic sense (Wurtzebach & Miles, 1994).

2.5.1 Market Analysis

Graaskamp (1996) defines market analysis as analysis of secondary data sources to define trends, patterns of geographic fragmentation, and clusters of market segmentation [that] scale the size of any enterprise opportunity and provide a link between site and marketplace. In other words, he argues that market analysis involves any investigation that permits focusing of a real estate project on selected segments of consumers with a unique unfilled product and location requirement (market gap) combined with a point in time when supply alternatives are limited (market window).

As shown in Table 2.3, Miles, Haney and Berens (1994) point out that there are two essential dimensions of market analysis: macro dimension (market) & micro dimension (individual property).

Table 2.3: Interrelating the two essential dimensions of market analysis

Dimension	Present	Future
Macro (Market)	*Current & Historical* - supply by segment - demand characteristics . preferences . income . tenant types - absorption & vacancies - rents & value (cap rates)	*Market Forecasts* - supply by segment - demand characteristics . employment growth . population growth . space needs - absorption & vacancies - rents & value (cap rates)
Micro (Individual Property)	*Subject Property & Comparables* - unit size & quality - demand characteristics . preferences . income . tenant types - operating expenses - absorption & vacancies - rents & value (cap rates)	*Future Performance of Subject Property* - operating expenses - absorption & vacancies - net operating income - market value

Furthermore, according to Graaskamp (1996), critical questions to be answered by market research models must focus on the following basic topics which represent the building blocks of market strategy and renovating and/or converting:

- Potential market gap opportunities consistent with enterprise abilities to capture that particular segment,
- Profile of prospect psychographics (study of life styles),
- Proportion of population meeting prospect profile,
- Profile of competitive supply meeting prospect needs,
- Proportion of supply historically provided in each period (absorption rate),
- Product and service standards (defining competitive standards),
- Product and service differentiation (providing competitive edge),
- Product and service pricing matrix,
- Potential elasticity of revenue,
- Pace and phasing of production including economies of scale required for pricing,
- Penetration required into prospect profile group as a percentage of period supply (capture rate),
- Profile of political power segment within entitlement process,
- Psychographics of the voting constituencies determining entitlement,
- Preconditioned mindset of the capital sources financing the real estate decision,
- Psychographics of the enterprise's personnel in terms of suitability to the task at hand.

An office development generally proceeds on the basis of a succession of market analyses. Barrett & Blair (1988), Etter (1988; 1995), Peiser (1992), Gause (1998), Wurtzebach & Miles (1994) discuss various types of studies that can be undertaken during this process. Each of these studies is undertaken to answer different questions, and not every project requires all of these studies.

2.5.2 Financial Feasibility Analysis

Following the market analysis, the second major component of a project's overall feasibility analysis is financial feasibility analysis. The financial feasibility analysis enables developers to determine if a proposed project will generate enough cash flow to pay the debt service on construction and permanent loans and provide an adequate return on the equity capital invested in the project (Gause, 1998). A project's feasibility is a function of its expected cost, its expected operating performance, the lender's requirements, mortgage market conditions and the developer / investor's required rate of return (Etter, 1988). As Canestaro (1989) states, there are three basic rules for measuring a project's financial feasibility, all evaluated in the context of time:

- The value of benefits generated by a project must exceed the capital investment,
- The annual benefits must generate profits in excess of the investors' desired rate of return,
- There must be a minimal difference between the anticipated project risk performance and the results of your feasibility analysis simulation.

These two analyses, when performed accordingly, help prevent an ill-timed or ill-conceived renovation and/or adaptive-reuse project to be put in the market. Otherwise, the project might turn into a dangerous drain on an owner's or developer's resources. A project that is based on well-examined analyses will avoid most of the possible traps and will help to maximize the profitability, viability, and likelihood of success.

3. METHODOLOGY

3.1 Study Design

When it comes to design characteristics of a research, having a qualitative or a quantitative paradigm requires a different approach. Leedy and Ormrod (2001) discuss that the data dictate the research method. They further argue that quantitative research is characteristically used to answer questions about relationships among measured variables with the purpose of explaining, predicting, and controlling phenomena. This approach is sometimes called the traditional, experimental, or positivist approach.

In contrast, qualitative research is typically used to answer questions about the complex nature of the phenomena, often with the purpose of describing and understanding the phenomena from the participants' point of view. The qualitative approach is also referred to as the interpretative, constructivist, or post-positivist approach (Leedy & Ormrod, 2001).

As Smith and Heshusius (1986) state, the interpretation given to the practices and results of research differs depending on the logic of justification one accepts. For quantitative inquiry, phrases such as "research has shown…" and "the results of research indicate…" are claims to an accurate reflection of reality or the claim of certitude that one has discovered how some bit of the social world really is. For qualitative inquiry, these phrases announce an interpretation that, to the extent that it finds agreement, becomes reality for those people as it is at and given time and place. The former expresses certitude; the latter presents a description constrained by values and interests to be compared with other descriptions constrained by other values and interests. These differences in the meaning of research results can be best explained by highlighting the basic characteristics that set the qualitative paradigm apart from the quantitative paradigm (Firestone, 1987; Merriam, 1998; Bogdan & Biklen, 2003).

The first major characteristic of qualitative research is: qualitative researchers are *interested in understanding the meaning people have constructed*, that is, how they make sense of their world and the experiences they have had in the world. In contrast to quantitative research, which takes apart a phenomenon to examine component parts (becoming variables of the study), qualitative research can reveal how all the parts work together to form a whole. It is assumed that meaning is embedded in people's experiences and that this meaning is mediated through the investigator's own perceptions. The key concern is understanding the phenomenon of interest from the participant's perspectives, not the researcher's.

The second characteristic of qualitative research is: the *researcher is the primary instrument for data collection and analysis*. Data are mediated through this human instrument, the researcher, rather than through some inanimate inventory, questionnaire, or computer.

A third characteristic of qualitative research is: *it usually involves fieldwork*. The researcher must physically go to the people, setting, site, and institution (the field) to observe behavior in its natural setting.

Fourth: qualitative research *primarily employs an inductive research strategy*. That is, this type of research builds abstractions, concepts, hypotheses, or theories rather than tests existing theory. Often, qualitative studies are undertaken because there is a lack of theory, or existing theory fails to adequately explain a phenomenon.

Finally: since qualitative research focuses on process, meaning, and understanding, *the product of a qualitative study is richly descriptive*.

In sum, used separately, qualitative and quantitative studies provide different kinds of information. However, as also stated by Firestone (1987) when focused on the same issue, qualitative and quantitative studies can triangulate – that is, use different methods to assess the robustness or stability of findings. By triangulating the methods used in a study, a researcher finds the opportunity to reach to different kinds of information about the social phenomena studied which can actually provide more and better evidence from which the researcher can construct meaningful propositions about the social world. In this case, the value of triangulation will lie in providing evidence – whether convergent, inconsistent or contradictory – such that the

researcher can enrich her/his understanding of the social phenomena (Mathison, 1988). Also as noted by Morse (1991), researchers who claim to purport to philosophical underpinnings of only one research paradigm shouldn't lose the sight of the fact that research methodologies are merely tools at our disposal for facilitating understanding of phenomena.

Like stated by Alan Peshkin (1993), I believe that no research paradigm has a monopoly on quality. None can deliver promising outcomes with certainty. None have the grounds for saying, "this is it" about their design, procedures, and anticipated outcomes. I also agree with the ideas that have been stated by Donald Warwick and Claire Selltiz, where the former view that every method of data collection is only an approximation to knowledge. Each provides a different and usually valid glimpse of reality, and all are limited when used alone. The latter, makes an observation saying that social research is continuing search for truth in which tentative answers lead to a refinement of the questions to which they apply (Peshkin, 1993).

So if summarized, qualitative and quantitative paradigms are very different in nature. However when used together, they may actually enrich the research study and may help to understand the phenomena more thoroughly. Especially, in situations where there is a huge difference in the availability of information and level of detail, the use of both approaches can strengthen the research under consideration immensely.

Thus, in this research, both qualitative and quantitative inquiry approaches were chosen to fully understand the obsolescence phenomenon in the corporate real estate world and to be able to produce a timeline integrated decision-tree as accurately as possible. To achieve this, a two-staged approach is applied. First, the qualitative approach is undertaken to understand the whys of the general phenomena. What are the typical problems faced in certain stages? What are the reasons causing these problems? What are the primary decisions offered as solutions? The purpose of the solutions, followed by assessment of these decisions.

Next, the quantitative approach is used to understand the timing and extent of the physical work needed once such problems begin to occur. Additionally, correlations between age of the building and different possible solutions along the economic

lifecycle of an office building is sought with the aim of forming a timeline-integrated decision-making tree to be used as an aid by the corporate real estate decision-makers.

3.2 Data Collection

Data conveyed through words have been labeled qualitative, whereas data presented in number form are quantitative. Qualitative data consist of "direct quotations from people about their experiences, opinions, feelings and knowledge" obtained through interviews; "detailed descriptions of people's activities, behaviors, actions" recorded in observations; and excerpts from various types of documents (Patton, 1990). "Collecting" data always involves selecting data, and the techniques of data collection.

In this study, to better understand the phenomena, two different sets of data are used involving both qualitative and quantitative characteristics. The first dataset contains 40 cases, all qualitative data, that have been gathered from numerous sources (Allan, 2000; Gause, 1996; Gause, 1998; Kiell, 1992; McGregor, 1999; ULI, 1978; Tierra Grande, 1993) to better understand issues like the typical problems experienced through the lifecycle of an office building, reasoning behind these problems, solutions applied for such problems, the purpose of these solutions, and finally, assessment of the solutions, showing the difference between the expected and achieved results. While choosing the cases the utmost importance was given on gathering similar information on a comparable level of detail. The process of searching the cases proved to be a time-consuming one, as most of the cases found were either focused on a smaller portion of the phenomenon, thus did not have all the information sought, and/or were not rich in detail to help understand the problem sufficiently.

The second dataset, consisting of both qualitative and quantitative type of data, was collected from Urban Land Institute (ULI) publications, mainly information packages and books (Gause, 1996; ULI, 1978), with the intention of understanding the extent of physical work required in relation to the alternative decisions (renovation and adaptive reuse –to and out of office buildings) and age of a building. Data is based on information supplied by the owners, developers, or architects in

response to numerous surveys conducted by the Urban Land Institute. Each case has information about the building type, its architectural development, construction characteristics, and general adaptability to its new use. Use of same source publications was essential to be able to obtain similar type of information for each case. Through this process initially a total of 263 cases were gathered.

3.3 Data Analysis & Interpretation

Bogdan & Biklen (2003) define data analysis as the process of systematically searching and arranging the interview transcripts, field notes, and other materials that the researcher accumulates to enable him/her to produce findings. Furthermore, they argue that data interpretation refers to developing ideas about the research findings and relating them to the literature and to broader concerns and concepts. Analysis involves working with the data, organizing it, breaking it into manageable units, coding it, synthesizing it, and searching for patterns. Interpretation involves explaining and framing the ideas in relation to theory, other scholarship and action, as well as showing why the findings are important and making them understandable.

With the first dataset, once the cases that have satisfying level of detail in their description were selected, the information was summarized and presented on one-to-two page information sheet(s) for each case including the following issues (see Appendix C for the summarized information sheets for each case):

1. Current use and user of the subject building (Building & Owner)
2. Definition of the problem (Problem)
3. Reason of the problem or reason to solve the problem (Reason & Reason*)
4. Purpose of the solution, questions to be answered (Purpose)
5. Proposed and/or applied solution to the problem (Solution)
6. Assessment of the proposed and/or applied solution (Assessment)

Following this process, mainly constant comparative method is used while analyzing the data, to identify the typical problems and the reasons of these problems that occur throughout the lifecycle of an office building. The constant comparative method of

data analysis was developed by Glaser & Strauss (1967) as the means of developing grounded theory, and it (Glaser & Strauss, 1967; Strauss, 1987; Strauss & Corbin, 1994) involves comparing one segment of data with another to determine similarities and differences.

As Merriam (1998) states, the basic strategy of the method is to do just what its name implies – constantly compare. The researcher begins with a particular incident –in this case, the problems that certain buildings have experienced– from an interview, field notes, or document, and compares it with another incident in the same set of data or in another set. These comparisons lead to tentative categories that are then compared to each other and to other instances. Comparisons are constantly made within and between levels of conceptualization until a theory, or a model –as it is the case here–, can be formulated.

With the second dataset, following the data collection stage–where 263 cases were gathered–, data validation of the cases was performed. Each case had information regarding the economics of and physical redevelopment work involved in renovating/adapting the subject project. Table 3.1 shows the categories under which information was collected initially:

Table 3.1: Information categories for each case

Project Economics
Case number
Project Name
Location
Original / Old Use
Converted / New Use
Year of Construction
Year of Conversion
Gross Area (sq. ft.)
Building Acquisition Cost ($)
Approximate Redevelopment Cost ($)
Cost per sq. ft.
Source of Financing
Rental Rates
Physical Redevelopment Work
Exterior Restoration
New Exterior Construction

Structural
Mechanical
Interior Demolition
New Interior Construction
Environmental Remediation
Landscaping
New Facilities, Parking
Site Restoration

For each category at least one more step was taken to validate or better present the data. The following section describes the validation process for each category in detail.

Case number

Initially the case number showed all 263 cases that were gathered, which included most, if not all, of the building categories. Once the data collection stage was finalized, these cases were filtered according to their building use, and only the cases that had office use as the original and/or converted use were kept in the database. (This process will be described further in the "original / old use" and "converted / new use" parts of this section.) Once the filtration process was over, there were 139 cases in the database that had office use either as the original and/or converted use. Following this filtration process, cases were renumbered according to this new sequence (see Appendix D for the data sheet).

Project Name

Although the project names remained unchanged, here, an additional category was formed to differentiate projects that had historical significance from others. Among the cases, there were buildings that were listed on the National Register of Historic Places (individually or within districts) or were designated as National Historic Landmarks, which was indicated by an abbreviation (NR or NHL) following the project name in the database. Thus in an additional column, historical significance information was provided by assigning following numbers to the corresponding cases: number 1 for National Register – NR, number 2 for National Historic Landmark – NHL and number 9 for not applicable – N/A.

Location

In the database there were cases from all over the United States. Although the locational difference and its impact is not one of the considerations of this study, location of these cases was categorized based on which state they were positioned. This allowed comparison of any possible state-level incentives provided for certain types of projects. The following is a list of the states in America, as listed by the United States Postal Service - USPS, with their assigned numbers respectively (Table 3.2).

Table 3.2: Official USPS Coding of the States

1	Alabama	31	Montana
2	Alaska	32	Nebraska
3	American Samoa	33	Nevada
4	Arizona	34	New Hampshire
5	Arkansas	35	New Jersey
6	California	36	New Mexico
7	Colorado	37	New York
8	Connecticut	38	North Carolina
9	Delaware	39	North Dakota
10	District Of Columbia	40	Northern Mariana Islands
11	Federated States Of Micronesia	41	Ohio
12	Florida	42	Oklahoma
13	Georgia	43	Oregon
14	Guam	44	Palau
15	Hawaii	45	Pennsylvania
16	Idaho	46	Puerto Rico
17	Illinois	47	Rhode Island
18	Indiana	48	South Carolina
19	Iowa	49	South Dakota
20	Kansas	50	Tennessee
21	Kentucky	51	Texas
22	Louisiana	52	Utah
23	Maine	53	Vermont
24	Marshall Islands	54	Virgin Islands
25	Maryland	55	Virginia
26	Massachusetts	56	Washington
27	Michigan	57	West Virginia
28	Minnesota	58	Wisconsin
29	Mississippi	59	Wyoming
30	Missouri	99	Other

Original / Old Use & Converted / New Use

In line with the ordinances and regulations, Table 3.3 shows a categorization of different building uses, with their assigned numbers to be used throughout this research:

(http://64.233.187.104/search?q=cache:hOOKcJDnAHUJ:www.city.ames.ia.us/attorneyweb/pdfs/Chap29A5.pdf+building+use+categories&hl=en)

Table 3.3: Building Use Categories

1	Office Use
2	Residential Use (short-term: hotel, long-term, group: apartment, household)
3	Trade Use (retail)
4	Industrial Use (warehouse, manufacturing, plant, mills)
5	Institutional Use (religious, school, medical center: hospital, community facility
6	Transportation, Communications & Essential Services Use (parking lot)
7	Miscellaneous Use (adult entertainment, jail, farm, commercial outdoor, vehicle repair)
8	Mixed with Office Use
9	Mixed without Office Use

Since the primary focus of this research is office buildings, following is a more detailed description of which types of buildings are included in this section (Table 3.4).

Table 3.4: Various Office Uses

Banking & bank related services
Brokerage houses
Data processing centers
Government offices
Insurance services
Lenders & credit services
Public & utility offices
Real estate & related services
Sales offices
General office uses
Medical & dental clinics (no overnight stay)
Laboratories & offices
Professional service offices: Accounts, architects, engineers, lawyers, etc.
TV & radio stations

Year of Construction

Here, initially, all information was converted into just one-per-case numeric numbers. In some cases, year of construction was provided as an estimate, like circa 1900 or 1980s. Or in some other cases a shorter range of estimate was provided as the year of construction, like 1914 – 1918. In these cases, the earliest year mentioned was accepted as the year of construction, since the building begins to deteriorate once the construction begins. Actually, prolonged construction process is one of the major reasons for physical obsolescence of office buildings, thus validating the stance taken here.

After this phase, the span of the cases to be covered was analyzed. The years of construction included in the database spanned 200 years. Thus, a 25-year range was considered to be appropriate to cover all of the cases in 10 categories as shown in Table 3.5.

Table 3.5: Year of Construction Categories

1	< 1775
2	1776 – 1800
3	1801 – 1825
4	1826 – 1850
5	1851 – 1875
6	1876 – 1900
7	1901 – 1925
8	1926 – 1950
9	1951 – 1975
10	1976 – 2000

Year of Conversion

Similar to the year of construction, the initial step also taken here was converting the information into one-per-case numeric numbers. The year of conversion for most cases was provided as an estimate, for example 1973 – 1976. In these cases, the latest year mentioned was accepted as the year of conversion, since the building begins to generate revenue only when it is totally completed.

Conversion year of the buildings included in the database encompassed a 40-year span, $1/5^{th}$ of the construction year. Thus, a 5-year range, $1/5^{th}$ of construction year

range, was considered to be appropriate to present all the cases. Eight categories formed as a result are shown in Table 3.6.

Table 3.6: Year of Conversion Categories

1	1961 – 1965
2	1966 – 1970
3	1971 – 1975
4	1976 – 1980
5	1981 – 1985
6	1986 – 1990
7	1991 – 1995
8	> 1995

Furthermore, an additional column was added to the database to calculate the age of the building at the time of the conversion. The calculation was made by subtracting the year of conversion from the year of construction. To assist the analysis, the following range of categories were formed to showcase the age of the buildings as shown in Table 3.7.

Table 3.7: Age Range of the Buildings

1	<25
2	25 – 49
3	50 – 74
4	75 – 99
5	100 – 124
6	125 – 149
7	>150

Gross Area

Since the data was gathered from the United States, the unit of measurement originally used to calculate gross area was square feet. As this study will be presented and published in Turkey, to expand the future comparability of the data with other sources that might be available in Turkey, a unit conversion index of 0.092903 was applied to convert square feet to square meters, where applicable. The following range was used to group the cases (Table 3.8):

Table 3.8: Gross Area (sq. meter) Range

1	< 1,000
2	1,000 - 4,999
3	5,000 - 9,999
4	10,000 - 49,999
5	50,000 - 99,999
6	> 100,000

Building Acquisition Cost

Similar to the other unit measures, since the data was collected in the United States, all currency figures are in dollars ($), and will remain so. However, since the time difference among the figures is fairly large, time and inflation variables should be taken into account for comparability issues. To do that, first the data was filtered down to just numeric numbers. (Original data had additional text beside the monetary values, which will be discussed in the next paragraph). Afterwards, all monetary values were adjusted to the latest year of all cases, 1996, by using the Gross Domestic Product (GDP) Calculator, also called as a GDP Inflation Calculator or a deflator (http://www1.jsc.nasa.gov/bu2/inflateGDP.html). Following is a table that shows the ranges created after this conversion (Table 3.9).

Table 3.9: Building Acquisition Cost ($) Range

1	< $100,000
2	$100,000 - $499,000
3	$500,000 - $999,000
4	$1,000,000 - $4,999,999
5	>$5,000,000

Previous to the filtration, there were two different but equally important data sets regarding building acquisition. A new column was created to present the second set of data, the building acquisition methods that took place for the subject cases. Following is a table that summarizes these methods (Table 3.10).

Table 3.10: Building Acquisition Methods

1	Purchase
2	Long-term lease
3	Already owned
4	Donation / Gift

5	Foreclosure / Trade

Approximate Redevelopment Cost

As mentioned earlier, any data regarding monetary values was adjusted to the latest year of all cases, 1996, in order to consider time and inflation for comparability issues. Table 3.11 shows the range categories formed after the GDP conversion.

Table 3.11: Approximate Redevelopment Cost Range

1	< $100,000
2	$100,000 - $499,000
3	$500,000 - $999,000
4	$1,000,000 - $4,999,999
5	$5,000,000 - $ 10,000,000
6	$10,000,000 - $50,000,000
7	> $50,000,000

Additionally in the original data, multiple costs were discussed in some of the cases especially when multi-phased renovations took place. For these cases, the sum of the multiple entries was used as the approximate redevelopment cost.

Cost per square feet ($/sq. ft.)

In this section, some of the figures were derived and/or estimated from other sources, or from simple calculations like actually dividing approximate redevelopment cost by gross area to fill all the vacant entries. Using both the approximate redevelopment and building acquisition costs in the calculation of the cost per gross area would be a better indicator. However, since fewer actual costs of building acquisition were reported, actual cost per square meter will be computed as follows:

(approximate redevelopment cost / gross area = actual cost per square meter)

In these calculations, naturally, the already adjusted and converted figures were used. As described earlier, gross area was converted from square feet to square meters and monetary values of approximate redevelopment costs were adjusted to 1996 with the aid of a GDP inflation calculator. Table 3.12 shows the ranges for this category.

Table 3.12: Cost/m^2 Range

1	< $500
2	$500 - $999
3	$1,000 - $1,499
4	$1,500 - $1,999
5	> $2,000

Source of Financing

Different sources used to finance these projects can be listed as follows, with the assigned category number to be used in the analysis process (Table 3.13):

Table 3.13: Source of Financing

1	Bonds & Loans: bank / insurance / mortgage / S&L
2	Public Funds: federal / state / city / school district
3	Private Funding / Equity: developer / owner / REIT
4	Public & Private Funding
5	Foundation / Development Grants / Donations
6	(Developer / Owner) Equity & Bank

Rental Rates

In accordance with the previous conversion and adjustment decisions, rental rates were first adjusted to the latest year of all cases, 1996, immediately after the data was filtered down to numeric numbers. Next, revenue per square foot was converted to revenue per square meter by multiplying rental rate by total square feet and then dividing the result by the square meters of gross area. Afterward, the data was sorted in ascending order, and the following table was created to form the listed ranges. Respective numbers are assigned to each category (Table 3.14).

The text portion of the initially filtered data that was later included in the range with the assigned numbers 9 and 99. The number 9 was used to replace the monthly rental rate figures that were not for office use, occurring when office was not the converted use. The number 99 was used for non-applicable cases like owned and/or not rented spaces.

Table 3.14: Rental Rate ($/$m^2$) Range

1	< $100
2	$100 - $199.99
3	$200 - $499.99

4	> $500
9	Non-office converted use (per month)
99	N/A (owned / not rented)

Physical Redevelopment Work

In this section, the data validation for all of the physical development work (exterior restoration, new exterior construction, structural, mechanical, interior demolition, new interior construction, environmental remediation, landscaping, new facilities/parking, site restoration) involved in renovating/adapting the buildings is discussed only once, as the same validation process is used for all entries. In the original dataset, the workload for each physical development work is expressed as a string data varying from none to extensive, where the term "workload" is used, in line with project management glossaries, to identify the amount of work units (the measurement of resources) assigned to a resource over a period of time.

The only difference among these categories is the non-existence of interior demolition and landscaping category for approximately 1/3rd of the cases, and environmental remediation category for almost 2/3rd of the cases, due to a differentiation in the data collection process of various sources. The following table shows the scale used to convert string data into ordinal data (Table 3.15).

Table 3.15: Physical Redevelopment Workload

1	None
2	Minor
3	Moderate
4	Extensive

Subsequently, a weighted average of the restoration work (exterior, interior, structural, mechanical combined), the new construction work (exterior, interior and new facilities/parking combined), the out-of building work (environmental remediation, landscaping, site restoration combined) and the all-physical work (including all the physical work categories) is calculated. Environmental remediation is included in the out-of building category rather than just the restoration work category for comparability concerns. Although environmental regulation appropriateness is a requirement for redevelopment work in the United States, it is unfortunately not yet a requirement for Turkish redevelopment sector.

Consequently, the following is a list of the final converted/adjusted categories used as inputs in SPSS for further analyses (Table 3.16). The categories indicated with an asterisk consist of data that have qualitative data characteristics, while remaining categories contain largely quantitative data.

Table 3.16: Converted/adjusted information categories for each case

Project Economics
Office use related case number
Historical significance*
Location by state*
Original / Old Use*
Converted / New Use*
Year of Construction (range)
Year of Conversion (range)
Age of the building (range)
Gross Area (square meter – range)
Building Acquisition Method*
Building Acquisition Cost ($, adjusted – range)
Approximate Redevelopment Cost ($, adjusted – range)
Cost per square meter (range)
Source of Financing*
Rental Rates ($/square meter – range)
Physical Redevelopment Work
Exterior Restoration*
New Exterior Construction*
Structural*
Mechanical*
Interior Demolition*
New Interior Construction*
Environmental Remediation*
Landscaping*
New Facilities, Parking*
Site Restoration*
Weighted average of restoration work
Weighted average of new construction work
Weighted average of out-of-the-building work
Weighted average of all physical work

After the data validation process, emphasis was given to the alternative solution types (renovation and adaptive reuse –to and out of office) and the age of the buildings (timing) to further analyze the phenomenon and form a timeline-integrated decision tree.

Subsequently, additional analyses were conducted for both the solution types and age range on the issues like the extent of physical work required, cost per square meter spent and rent per square meter obtained, acquisition and development costs incurred, and acquisition type and financing sources used.

3.4 Reliability, Validity & Researcher Bias

Furthermore, Leedy and Ormrod (2001) argue that the internal validity of a research study is the extent to which its design and the data that it yields allow the researcher to draw accurate conclusions about cause-and-effect and other relationships within the data, while the external validity is the extent to which its results apply to situations beyond the study itself – in other words, the extent to which the conclusions drawn can be generalized to other contexts.

In this study, there are no attempts made to seek external validity of this research, as the results are strictly limited to the cases that they were derived from. However, the internal validity of the research is ensured by thorough data validation process combined with numerous referrals to the original documents wherever applicable. In addition, the question of internal validity is further secured by triangulating the research methodologies with the use of both qualitative and quantitative approaches to understand the phenomenon.

According to Merriam (1998), reliability – the extent to which there is consistency in the findings – is enhanced by the investigator explaining the assumptions and theory underlying the study by triangulating the data and by leaving an audit trail. That is, by describing in detail how the study was conducted and how the findings were derived from the data.

Merriam (1998) further argues that in a qualitative study, the researcher is the primary instrument for gathering and analyzing data and, as such, can respond to the situation by maximizing opportunities for collecting and producing meaningful information. Conversely, the researcher as human instrument is also limited by being human – that is, mistakes are made, opportunities are missed, personal biases interfere. Human instruments are as fallible as any other research instrument.

As an important tool of this research, I, the researcher, tried to prevent personal biases that might interfere with the findings and results of the study by triangulating the data and presenting superior records for the arguments that I derive from the case studies as an audit trail for further use.

4. FINDINGS & RESULTS

The purpose of this chapter is to present the findings of the two datasets included in this study. As described earlier in the methodology section, the first dataset involves 40 case studies and is used to shed light to the typically experienced problems, reasons of these problems, alternative solutions to the problems and assessment of the suggested solutions. Afterward, the findings of the second dataset is introduced to better understand the implications of alternative solution types and age of the buildings on the issues like, the extent of physical work required, cost spent and rent achieved per square meter, acquisition and development costs incurred, and acquisition types and financing sources preferred.

4.1 Typically Experienced Problems & Reasons of these Problems

Supporting the results of the previously conducted review of literature, the comparative analysis of the 40 cases showed that there are two ultimate decisions made when faced with various types of obsolescence problems in a building. First one is *renovation*, where the original (old) use and the converted (new) use are the same. The impact of obsolescence is typically in the form of reduced quality and perceived status of building slipping down from a Class A to either Class B or C, thus necessitating certain changes to improve the image and the perceived quality of the building. The other possible decision is an *adaptive reuse*, where the original (old) use is converted into a completely different use mostly as a result of the significant changes in market dynamics that occur in time.

Table 4.1 lists the problems and the suspected reasons of these problems for each case that led decision-makers to the ***renovation*** of the space under consideration as the solution. In the same table, major obsolescence types, which were explained earlier in the review of literature chapter, initiating these problems are suggested in a separate column.

Table 4.1: Problems leading to the Solution: *Renovation*

(Old use: Office/Mixed Use → New Use: Office/Mixed Use w Office)

Case #:	P: Problems (*due to*) R: Reasons	Obsolescence Type:
1	Replacing tenants lost through normal attrition ***due to*** the highly competitive and increasingly sophisticated marketplace	Economic, Market
2	Substantial repair needed ***due to*** aging and deterioration	Technological, Legal
3	Shabby market ***due to*** the general decline of the downtown	Social, Market
4	Change in market dynamics, need to appeal to a new tenant population ***due to*** losing the largest tenant as a result of a downsizing industry	Market, Functional
5	Overbuilt market, potential change in market dynamics ***due to*** a new emerging market	Functional, Market
8	Out-dated ***due to*** aging	Technological, Legal
9	Dated and dark ***due to*** aging, redundancy, design failures	Technological, Legal
10	Physical damage ***due to*** an earthquake	Physical
17	Surplus workspace ***due to*** outsourcing	Economic, Functional
21	Outdated, premier tenants lost to newer properties, overbuilt market ***due to*** the underutilization of the asset	Technological, Market, Legal
22	Surplus workspace ***due to*** the elimination of non-performing asset from the estate	Economic, Functional
25	Partial renovation over time resulted in unplanned, disjointed spaces ***due to*** business expansion, increased production, new technology needs	Functional, Technological
29	Outdated, blackened, and crumbling ***due to*** decades of neglect, and non-matching, artless makeshift alterations made over time	Functional, Technological, Social
30	Outdated, slipped into Class B status ***due to*** aging	Technological
35	Outmoded, tired, many code deficiencies ***due to*** a piecemeal approach to repair, remodeling, and renovation	Technological, Legal
36	Retaining the tenant base ***due to*** the changing and increasingly competitive market	Technological, Functional
37	Outdated, Slipped into Class B status ***due to*** aging	Technological, Legal, Functional
38	Outdated, Slipped into Class B status ***due to*** outdated systems and design	Technological, Social, Legal
39	Surplus space ***due to*** the departure of the largest tenant	Economic, Functional
40	Outdated ***due to*** not being able to keep up with change	Social, Market

As it can be seen from the table, particular reasons lead to certain problems that are caused by specific obsolescence types. Most common examples to prove this argument are: the problem of outdated office buildings slipping into a lower classification *due to* aging and redundancy *initiated* mostly *by* technological obsolescence (9 out of 20 cases); the problem of replacing tenants *due to* highly competitive and constantly changing marketplace, *initiated by* economic and market obsolescence (3 out of 20 cases); the problem of surplus workspace *due to* some sort

of business related change, and unplanned and/or disjointed expansion, *initiated* mainly *by* economic and functional obsolescence (3 out of 20 cases).

Below table, table 4.2, illustrates the problems and the suspected reasons of these problems for each case that led decision-makers to the ***adaptive reuse*** of the space under consideration as the solution. Similarly, in the same table, major obsolescence types causing these problems are suggested in a separate column.

Table 4.2: Problems leading to the Solution: *Adaptive Reuse*
(Old use: A Use other than Office → New Use: Office/Mixed w Office)

Case #:	**P: Problems (*due to*) R: Reasons**	**Obsolescence Type:**
6	Loss of major anchor tenants ***due to*** a regional mall built near by, resulting an overbuilt retail market, that required looking into other markets (insufficient office)	Market
7	To consolidate several regional offices into a new corporate headquarters that would make a statement ***due to*** create a unified corporate identity	Social, Market Economic
11	Change in market dynamics and use ***due to*** market shift	Market
12	Change in market dynamics and use ***due to*** market shift	Market
13	Change in market dynamics and use ***due to*** market shift	Market
14	Change in market dynamics and use ***due to*** the lack of commercial vitality	Functional, Market
15	Change in market dynamics and use ***due to*** market shift	Market, Legal, Social
16	Change in market dynamics and use ***due to*** market shift	Market, Social
18	Change in market dynamics and use ***due to*** market shift	Functional, Market, Social
19	Lack of maintenance ***due to*** redundancy for nearly a decade	Functional, Market, Social
20	Lack of maintenance for ten years ***due to*** redundancy	Social, Market
23	Change in market dynamics and use ***due to*** redundancy, under use of a facility	Social, Market Economic
24	Change in market dynamics and use ***due to*** market shift	Market, Social
26	Change in market dynamics and use ***due to*** market shift	Functional, Market, Social
27	Lack of maintenance ***due to*** redundancy	Market, Social
28	Lack of maintenance for over ten years ***due to*** redundancy	Market, Social
31	Change in market dynamics and use ***due to*** market shift causing a potential in another expanding industry	Functional, Market
32	Failure to capture the intended affluent market and unable to retain the anchor tenant ***due to*** market shift	Economic, Market
33	Vacant for eight years ***due to*** huge excess space unable to be absorbed by a soft market	Economic, Market, Functional
34	Viability of keeping and converting the existing building ***due to*** changes in regulations and market shift	Legal, Market, Functional

Correspondingly, table 4.2 highlights the major recurring examples of the problems that lead to an adaptive reuse decision of the space: the problem of change of use *due to* market shift, *initiated by* market, legal, social, and/or functional obsolescence (12

out of 20 cases); the problems of negligence and lack of maintenance *due to* redundancy, *initiated* mainly *by* functional, market and social obsolescence (5 out of 20 cases).

A close analysis of tables 4.1 and 4.2 show that, as the review of literature has also previously suggested, an office building rarely experiences physical obsolescence through years of aging, unless there is an exterior damaging factor like natural disasters. Proving this argument, throughout all forty cases that were analyzed only one of them experienced physical obsolescence due to an earthquake.

Although almost all of the obsolescence types are experienced by at least one of the cases in each solution category, renovation or adaptive reuse, there are significant differences between each category in the rate of recurrence of each of these obsolescence types. For instance, technological and functional obsolescence are the most frequently experienced types in the renovation category, while market and social obsolescence are the mostly recurring types for the adaptive reuse category.

4.2 Purpose & Assessment of the Typical Solutions

As mentioned in the methodology section, purpose and assessment of each decision were collected for each case as well. Following tables, table 4.3 and table 4.4, aim to identify the purpose of each decision and to provide an assessment regarding how similar the expectation and the realization of the solutions have become.

Table 4.3: Assessment of the Solution: *Renovation*
(Old use: Office/Mixed Use → New Use: Office/Mixed Use w Office)

Case #:	P: Purpose	A: Assessment
1	Breathing new life to the tired building by upgrading and refinishing all public places	Significant retention rates with existing tenants, 95% occupancy and rising
2	Increasing the property's value by $3 million through a $2 million renovation	The goal of a $3 million value increase was reached one year earlier than planned
3	To revitalize the downtown waterfront and bring viable business & retail back to a deteriorating CBD	Success in bringing office tenants back to downtown and catalyzed the revitalization of the CBD
4	To appeal to a new tenant population	Leasing success
5	To jump-start economic development in the once thriving financial and insurance district	The incentive package for new commercial tenants a 50% real estate tax abatement for the first 3 years of occupancy and a 30% reduction in electricity costs over 2 years

Case #:	P: Purpose	A: Assessment
8	To turn the building into a Class A property that could attract and maintain a tenant base of small professional firms	Building's occupancy rate rose from 40% to 95%, by upgrading the appearance of the building and updating its energy systems
9	To transform a dated, dark 12-story building into a bright, modern 15-story tower	Completed on time and within budget
10	To strengthen, restore and connect the four landmark buildings	One of the most comprehensive seismic retrofits of a historic complex in the US
17	To fill the void in the workspace by re-organization	Avoided company from consuming resources and incurring costs
21	To turn a Class C building into a Class A	Occupancy rate increased from 16% to 70%, in an extremely overbuilt office market (city-wide vacancy 40%)
22	To eliminate a non-performing asset	The benefits were manifold
25	To create a functional and supportive environment	Available for use in 23 weeks, a clear case of turning adversity to advantage
29	To disprove the widely accepted notion that the cost of expensive, high-quality restoration cannot be recovered in rents	Opened with 48% occupancy at a time when commercial space was extremely oversupplied, rising to 86% in 3 years. Achieved top rental rates, matching event the newest Class A space
30	To maintain the building's healthy 95% occupancy rate, which began to decrease recently, and prevent slipping into a Class B	A significant impact on tenant retention, and an approximate 25% improvement in lease economics, matching with Class A
35	To provide the building with an identity	Strongest asset for success was its location
36	To retain the tenant-base	The occupancy rate was 97% and was never lower than 85% during the program
37	To restore the architectural grandeur of the building while bringing it up to the current standards	Functionally, the building now equals the newest of office towers, along with physical improvements
38	A gut renovation to turn a tired Class B property into a renewed Class A structure	New design, new systems, ideal location → marketed as a Class A, occupancy 90%
39	To market the unusually large chunk of space as a hole, if possible	"Building within a building" concept, a risky but unique approach
40	To be able to compete not only regionally but also citywide	"Image is everything" concept, helped to create a feeling of unity (formerly lacking)

Table 4.3 demonstrates that the decision to renovate is mostly preferred as the solution among the cases where the purpose is mostly to preserve the Class A status and thus the compatibility of the building among the top-quality, brand-new office buildings by avoiding any decrease in quality, and by retaining the existing tenant-base. In almost all cases, the realized results seem to match, if not exceed the expected results. Some of the cases even proved the widely disputed argument right showing that the cost of expensive, high-quality restoration can actually be recovered in Class A rents.

As table 4.4 illustrates, adaptive reuse is chosen as the solution when the original use of a building no longer produces the most economically viable result. Change in business applications had an immense impact on the office use paradigm, enabling developers to consider converting intangible qualities of especially historic buildings

into tangible economic gain. The conversion of historically and/or socially important buildings increases, as the communities continue to take special interest in the preservation of these physical resources. Unique development opportunities arise from such conversions that are otherwise impossible to even deliberate.

Table 4.4: Assessment of the Solution: *Adaptive Reuse*
(Old use: A Use other than Office → New Use: Office/Mixed w Office)

Case #:	P: Purpose	A: Assessment
6	To convert a retail space into an office space that meets the rapidly growing operations need of the business within six months, in an undersupplied office market	The conversion provided excellent space at a better price-to-value ratio than built-to-suit space and other alternatives
7	To consolidate several warehouses into a new corporate headquarters that would make a statement	New workplace will be able to evolve as new people and technologies join the corporate culture
11	To convert a warehouse into a high-tech office space	The building's accessibility and its structural advantages made the conversion a natural choice
12	To convert historic residences into office and meeting space	Fully leased over a planned 18-month period
13	To provide administrative space for additional personnel resulting from a merger	The goal of providing efficient building space was met
14	To restore the commercial vitality by converting a deteriorated two-square-block area into a modern office complex	Development strategy presumed that the new office space would be attractive to legal firms & other professionals desiring locations close to the new county courts
15	To convert a surplus school building into a multiple use with office component	Low acquisition cost and having mixed-uses undoubtedly contributed to the project's vitality helping to reestablish confidence in the downtown area
16	To convert a house block into a mixed use with office	Structurally over-designed nature of warehouses and factories make these types of buildings rather attractive for reuse
18	To convert intangible qualities of a historic building into tangible economic gain	The character of a building is considered a substantial asset since tenants may be willing to pay high rents for unique places
19	To transform a plant into a headquarters	The reuse of a prominent landmark makes land-swap type exchanges attractive
20	The revitalization of a neglected area into an economically priced office space that would appeal to the growing high-tech community	The redevelopment of the building generated demand for wider revitalization in commercial and residential market
23	To convert the existing, vacant industrial complex to a corporate headquarters	A hodge-podge of industrial buildings is integrated into a cohesive, stylish HQ
24	To recycle a 40-year-old former industrial building as a modern office building	The new workspace is considered as a catalyst for organizational change promoting teamwork
26	To convert the nine-building mill complex into a first-class office space	Successful implementation of the "Lowell Plan"
27	To retain the historic character while enhancing its condition for adaptive reuse	Returning a fully occupied building to the city's tax roll

Case #:	P: Purpose	A: Assessment
28	To renovate a century-old building into one of the most energy-efficient, environmentally responsible office buildings ever designed	The development proved that an office building can be a star performer in environmental terms & economically and still be cost-effective & highly functional
31	To convert the historic structure into a commercial asset designed to capture and accommodate the region's expanding high-tech and biotechnology industries	A unique knowledge of emerging trends in the biotech industry is used to gain a competitive advantage in the marketplace for this kind of commercial real estate
32	A lease-driven conversion of a mall to a business center	The paradigm shift (open-plan) of offices make retail space suitable for conversion; success also ascribed to pre-leasing
33	To convert a warehouse into a unique office space	The property's larger-than-life size and aura was a potential marketing advantage coupled with the ability to offer rents that were substantially below market
34	To take a featureless tilt-up, concrete warehouse and turn it into a high-profile office building	A great deal of red tape would be encountered if the developer took a new construction route over an adaptive reuse

Surplus buildings, primarily public facilities, are another example of underutilized assets. These types of buildings provide developers with huge advantages especially in highly competitive markets by enabling them offer below market rates and still manage to be economically viable mostly as a result of their low acquisition costs. Structurally sound buildings with flexible planning capabilities are usually considered as excellent candidates for businesses that experienced changes like merger, downsizing or expansion. As most of the cases presented in this study support, when planned carefully, such conversions generate better price-to-value ratios along with quicker and more flexible solutions.

Once the problems and most common reasons of these problems are clarified, and a reality check is performed between the chosen solutions and suspected purpose of these solutions, more detailed analyses are carried out focusing on specific issues like the extent of physical work required for each type of solution, whether there is an association between the age of a building and the amount of work it required for renovation or conversion, numerous comparisons among cost versus rent per square meter, acquisition and development cost, and acquisition type and financing source in relation with the solution type and age.

Contrary to the previous dataset, in this stage the analyses are based on both qualitative and quantitative data. Besides currency and area measurement related figures, like cost/sqm, rent/sqm, and gross area, the dataset is heavy on ordinal variables –meaning that the data consists of ranks, assignments to ordered categories,

or of sequencing information. There are also some nominal variables displaying unique qualitative attributes of the dataset.

4.3 Original (Old) Use versus Converted (New) Use

Figure 4.1 demonstrates the data initially collected, showing the cumulative counts for original (old) and converted (new) use of each case. The x-axis shows the new use categories, and the color of the bar shows the old use of the facilities for all 263 cases.

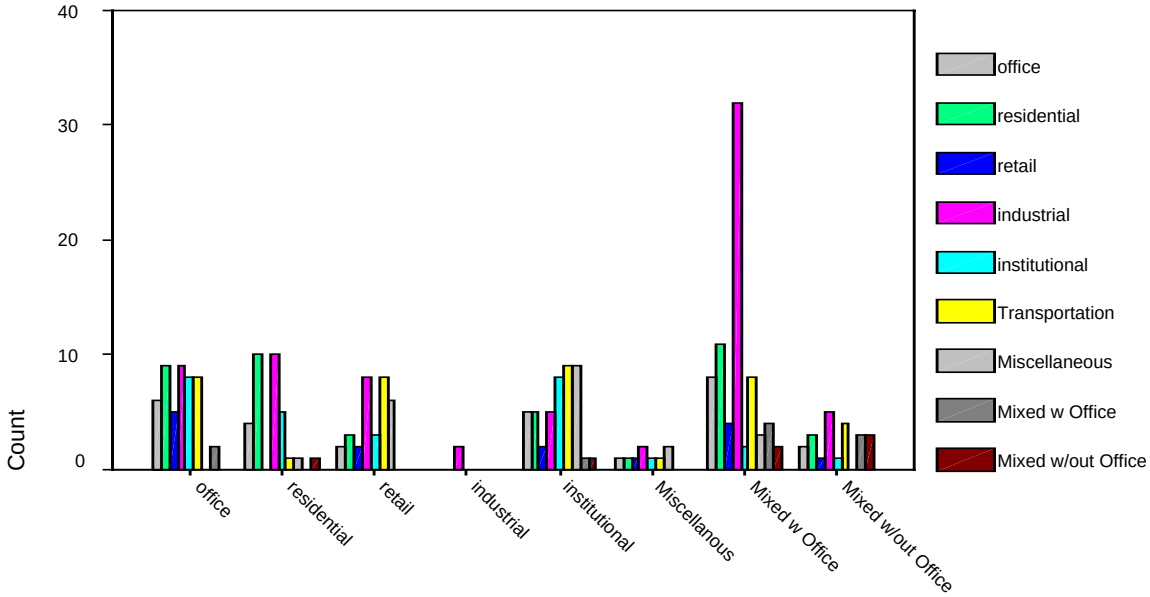

Figure 4.1: New Use vs. Old Use (all cases)

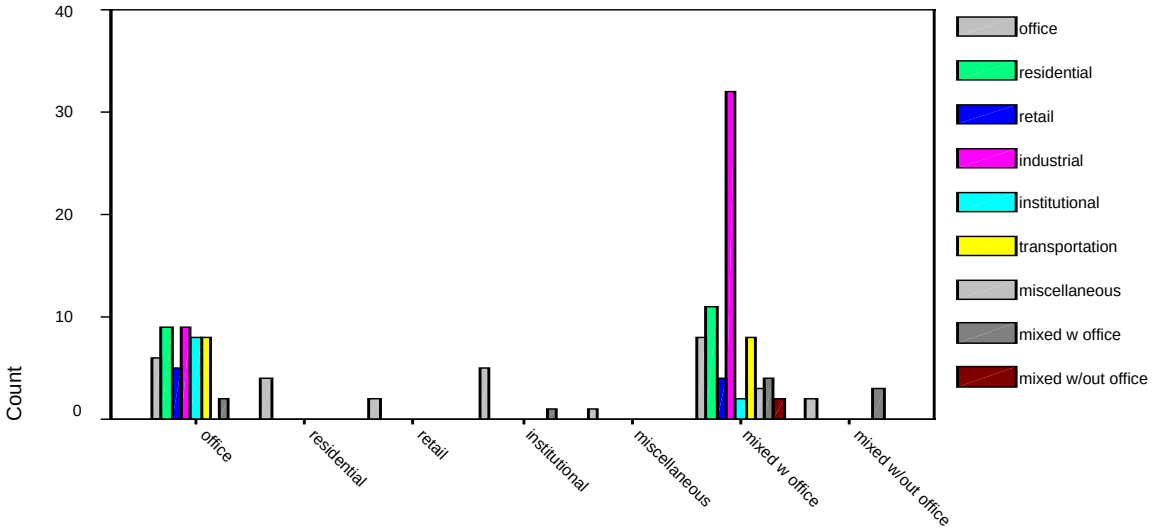

Figure 4.2: New Use vs. Old Use (just office cases)

A similar chart is created for the "just office related" dataset and presented in Figure 4.2. As seen from the chart, the highest converted facilities are industrial facilities and they are mostly converted into mixed projects with office use. Among the dataset, almost all types of uses have been converted into office use, except miscellaneous and mixed without office use types.

Following the visual charts used for a quick grasp of the dataset at hand, a cross-tabulation analysis is performed to examine the relationship between new use and old use categories. Table 4.5 and 4.6 demonstrate the cross tabulation tables of the original and converted uses for all 263 cases originally collected for this research. The tables illustrate the pattern of change in the form of an old (original) use: new (converted) use matrix. Changes out of industrial use accounts for a little more than one fourth of all original uses (28%), and evenly, changes to mixed with office use accounts for 28% of all converted uses. Specifically, industrial to mixed with office use type of "use change" (adaptive reuse/conversion) is dominant (12% of all cases). Industrial to residential and residential to mixed with office use types of changes are the other dominant categories with a percentage of 4 among all cases. Conversely, the only dominant renovation category is the residential use (4% of all cases).

However, as table 4.7 and 4.8 illustrate, among 139 cases that only include office use-related renovations and conversions, changes out of industrial and office uses account for the highest two of all original uses (29% and 20% respectively). Additionally, changes to mixed with office use accounts for approximately half of all converted uses (53%), followed by just-office use with 34%. In other words, industrial, office and residential uses rank highest in the converted from use-type, while office and mixed use with office are considered the two most viable alternatives as the converted uses of these facilities. Two types of conversion are dominant: industrial to mixed with office use (23% of all cases), and residential to mixed with office use (8% of all cases).

Out of 139 cases, unfortunately, there are only 20 cases that deal with renovation where the old and new uses are both office types. Rest is adaptive reuse cases where either the original use is converted into an office use (101 cases), or office use is converted into a whole different new use (18 cases).

Table 4.5: Cross Tabulation of Original and Converted Uses, All Cases (frequency distribution)

Old Use / New Use	Industrial	Institutional	Residential	Retail	Office	Mixed w O.	Mixed w/out O.	Trans.	Misc.	Total
Industrial	2	5	10	8	9	**32**	5	0	2	**73**
Institutional	0	**8**	5	3	**8**	2	1	0	1	**28**
Residential	0	5	**10**	3	**9**	**11**	3	0	1	**42**
Retail	0	2	0	2	**5**	**4**	1	0	1	**15**
Office	0	5	4	2	**6**	**8**	2	0	1	**28**
Mixed with Office	0	1	0	0	2	**4**	3	0	0	**10**
Mixed w/out Office	0	1	1	0	0	**2**	**3**	0	0	**7**
Transportation	0	**9**	1	**8**	**8**	**8**	4	0	1	**39**
Miscellaneous	0	**9**	1	**6**	0	3	0	0	2	**21**
Total	**2**	**45**	**32**	**32**	**47**	**74**	**22**	**0**	**9**	**263**

Renovation

Table 4.6: Cross Tabulation of Original and Converted Uses, All Cases (percent distribution)

Old Use \ New Use		Industrial (n=2)	Institutional (n=45)	Residential (n=32)	Retail (n=32)	Office (n=47)	Mixed w O. (n=74)	Mixed w/out O. (n=22)	Trans. (n=0)	Misc. (n=9)	Total (n=263)
Industrial	(n=73)	1%	2%	**4%**	**3%**	**3%**	**12%**	2%	0%	1%	**28%**
Institutional	(n=28)	0%	**3%**	2%	1%	**3%**	1%	0%	0%	0%	**11%**
Residential	(n=42)	0%	2%	**4%**	1%	**3%**	**4%**	1%	0%	0%	**16%**
Retail	(n=15)	0%	1%	0%	1%	2%	2%	0%	0%	0%	**6%**
Office	(n=28)	0%	2%	2%	1%	2%	**3%**	1%	0%	0%	**11%**
Mixed w Office	(n=10)	0%	0%	0%	0%	1%	2%	1%	0%	0%	**4%**
Mixed w/out Office	(n=7)	0%	0%	0%	0%	0%	1%	1%	0%	0%	**3%**
Transportation	(n=39)	0%	**3%**	0%	**3%**	**3%**	**3%**	2%	0%	0%	**15%**
Misc.	(n=21)	0%	**3%**	0%	2%	0%	1%	0%	0%	1%	**8%**
Total	(n=263)	**1%**	**17%**	**12%**	**12%**	**18%**	**28%**	**8%**	**0%**	**3%**	**100%**

Table 4.7: Cross Tabulation of Original and Converted Uses, Just Office Cases (frequency distribution)

Old Use / New Use	Industrial	Institutional	Residential	Retail	Office	Mixed w O.	Mixed w/out O.	Trans.	Misc.	Total
Industrial					**9**	**32**				**41**
Institutional					**8**	2				10
Residential					**9**	**11**				**20**
Retail					5	4				9
Office		5	4	2	6	**8**	2		1	**28**
Mixed with Office		1			2	4	3			10
Mixed w/out Office						2				2
Transportation					**8**	**8**				**16**
Miscellaneous						3				3
Total	0	6	4	2	**47**	**74**	5	0	1	**139**

To Office	Renovation	From Office

Table 4.8: Cross Tabulation of Original and Converted Uses, Just Office Cases (percent distribution)

Old Use \ New Use		Industrial (n=0)	Institutional (n=6)	Residential (n=4)	Retail (n=2)	Office (n=47)	Mixed w O. (n=74)	Mixed w/out O. (n=5)	Trans. (n=0)	Misc. (n=1)	Total (n=139)
Industrial	(n=41)					**6%**	**23%**				**29%**
Institutional	(n=10)					**6%**	**1%**				**7%**
Residential	(n=20)					**6%**	**8%**				**14%**
Retail	(n=9)					**4%**	**3%**				**6%**
Office	(n=28)	0%	**4%**	**3%**	**1%**	**4%**	**6%**	**1%**	0%	**1%**	**20%**
Mixed w Office	(n=10)	0%	**1%**	0%	0%	**1%**	**3%**	**2%**	0%	0%	**7%**
Mixed w/out Office	(n=2)					0%	**1%**				**1%**
Transportation	(n=16)					**6%**	**6%**				**12%**
Misc.	(n=3)					0%	**2%**				**2%**
Total	(n=139)	**0%**	**4%**	**3%**	**1%**	**34%**	**53%**	**4%**	**0%**	**1%**	**100%**

Thus, it is vital to emphasize once more that the significant difference among the sample sizes of the groups (ao=101, oa=18, r=20) was a crucial setback and has always been kept in mind while conducting the analyses and evaluating the results. Consequently, as previously mentioned in the introductory and methodology chapters, there are no attempts made to generalize any of the findings presented here.

4.4 The Extent of Physical Workload Required

Now that the adaptability of office use to and/or from any type of facility (with few exceptions on each side) is established, more detailed analyses are conducted to understand the extent of physical workload that would be required if and when such decisions are to be made for either a renovation or an adaptive reuse of a facility. As explained previously in the methodology section, ten counts of physical work data available in the dataset are averaged and complied into four different categories to be able to conduct further and more detailed analyses.

These categories are: *restoration work (rework)* including exterior restoration, interior restoration, structural, and mechanical work combined; *new construction work (newwork)* including exterior construction, interior construction, and new facilities and parking work combined; *out-of-building work (outwork)* including environmental remediation, landscaping, and site restoration work combined; and *all physical work (allpwork)* including all of the above categories. For each physical work category, average mean scores between 2 to 2.49 show the need for a minor level of physical workload, 2.50 to 3.49 show the need for a moderate level of physical workload and 3.50 to 4.00 show the need for an extensive level of physical workload.

4.4.1 The Extent of Physical Workload Required in relation to Each Solution Type

A series of analyses are performed to test whether such a relation exists. First test among others is checking the normality of the data so that further appropriate tests can be identified. Such test is the Kolmogorov-Smirnov and Shapiro-Wilk (K-S) test. This test compares the set of scores in the sample to a normally distributed set of scores with the same mean and standard deviation. If the test is non-significant

($p>0.05$) it indicates that the distribution of the sample is not significantly different from a normal distribution, meaning it is probably normal. If, however, the test is significant ($p<0.05$) then the distribution in question is significantly different from a normal distribution, in other words it is non-normal (Field, 2000). Following is a K-S test of the categorized physical work data. As table 4.9 demonstrates for all categories p is less than 0.05, indicating that the distribution is significantly different from normal distribution. Individual categories are a lot more significantly different than the overall category.

Table 4.9: Tests of Normality

Physical Work Required	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
REWORK	.124	134	.000
NEWWORK	.141	134	.000
OUTWORK	.161	134	.000
ALLPWORK	.082	134	.027

a. Lilliefors Significance Correction

Non-normal data requires non-parametric tests to inquire any relations among groups. On SPSS, one of the available tests for such analysis is called the Mann-Whitney U test and it works by looking at differences in the ranked positions of scores in different groups (Field, 2000). The first part of the output, table 4.10, summarizes the data after it has been ranked. Specifically, SPSS tells us the average and total ranks in each condition. The Mann-Whitney U test relies on scores being ranked from lowest to highest: therefore, the group with the lowest mean rank is the group with the greatest number of lower scores in it (Field, 2000). Similarly, the group that has the highest mean rank should have a greater number of high scores in it.

Table 4.10: Mean Ranks (Mann-Whitney U test)

Physical Work Required	Solution	N	Mean Rank	Sum of Ranks
REWORK	Adaptive Reuse	118	70.89	8364.50
	Renovation	20	61.33	1226.50
	Total	138		
NEWWORK	Adaptive Reuse	118	72.74	8583.50
	Renovation	20	50.38	1007.50
	Total	138		
OUTWORK	Adaptive Reuse	115	69.70	8015.00
	Renovation	19	54.21	1030.00
	Total	134		

ALLPWORK	Adaptive Reuse	118	72.28	8528.50
	Renovation	20	53.13	1062.50
	Total	138		

The second output, table 4.11, provides the actual test statistics for the Mann-Whitney U test. For restoration work (*rework*) and out-of-building work (*outwork*) data, the Mann-Whitney U test is non-significant between adaptive reuse and renovation categories. However, the test is significant for new construction work (*newwork*) and all physical work (*allpwork*) data, meaning that ranking of the two groups -adaptive reuse and renovation- are indeed significantly different in the extent of physical workload they require in these categories. Furthermore, the value of the mean rankings indicates that the adaptive reuse group had significantly higher levels of these physical work types than the renovation group. In other words, adaptive reuse group requires a greater amount of workload for each work category than the renovation alternative.

Table 4.11: Test Statistics

Tests	REWORK	NEWWORK	OUTWORK	ALLPWORK
Mann-Whitney U	1016.500	797.500	840.000	852.500
Wilcoxon W	1226.500	1007.500	1030.000	1062.500
Z	-.997	-2.340	-1.647	-1.983
Asymp. Sig. (2-tailed)	.319	.019	.100	.047

a. Grouping Variable: adaptive reuse vs. Renovation

Following chart, figure 4.3, is used to illustrate the pattern shown in Mann-Whitney U test. As clearly seen from the chart, all repeated measures (different types of physical work required) are higher in the adaptive reuse group than the renovation group, meaning that the extent of workload required for each physical work is a lot more for adaptive reuse group than it is for the renovation group. However, according to the Mann-Whitney U test, only differences in new construction work (*newwork*) and all physical work (*allpwork*) rankings are significant at the 0.05 level.

Furthermore, when the extent of physical workload required for each group is observed individually, it is interesting to see that although the extent of restoration work (*rework*) required is the highest for both solution types, when it comes to new construction work (*newwork*) and out-of-building work (*outwork*) categories, the extent of workload required for the renovation alternative seems a lot less than the adaptive reuse alternative.

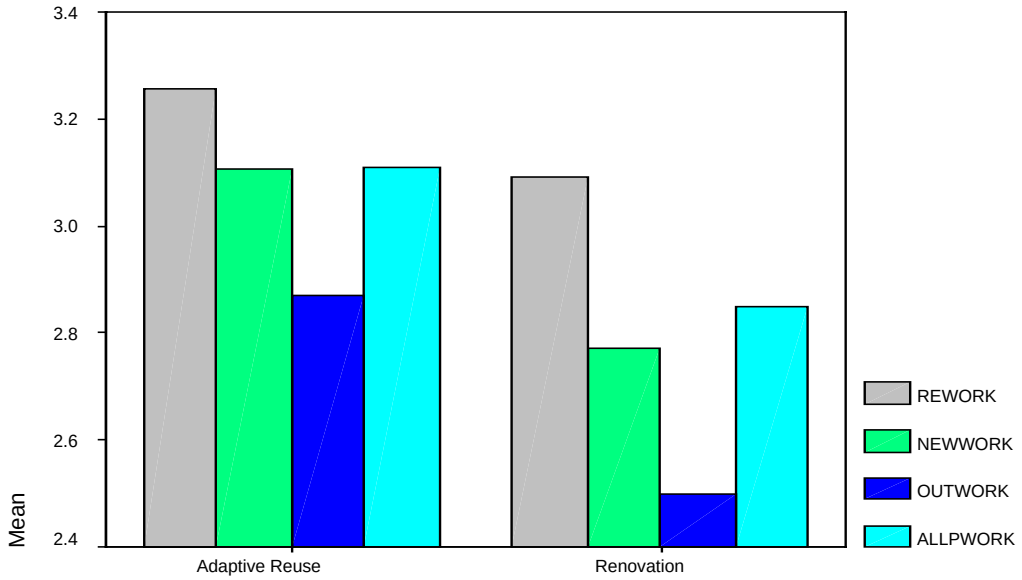

Figure 4.3: The Extent of Physical Workload Required for each Solution Type

Up until now, because of the limitations of the initial dataset, the analyses were restricted to renovation (new use = old use) and adaptive reuse (old use = some type of use other than office, new use = office related use) decisions. However, second dataset at hand provides an additional advantage and allows us to look at adaptive reuse solution from another perspective as well: office use (old use) converted into a completely different use (oa). Hence even though sample sizes of renovation (n=20) and adaptive reuse –from office to some other use (n=18) are rather small compared to adaptive reuse –from some other use to office (n=101), an association test quite similar to Mann-Whitney U test is conducted for all three categories. Once again, it is important to note that results of the tests are and should be evaluated within the limits of the dataset.

Kruskall-Wallis test is a procedure that compares two or more groups of cases on one variable (SPSS, 2001). Similar to Mann-Whitney U test, it uses numeric variables that can be ordered and a $p<0.05$ measure is sought for significance. Correspondingly, the first part of the output, table 4.12, summarizes the data after it has been ranked. SPSS data output tells us the average and total ranks in each condition. Like Mann-Whitney U test, Kruskall-Wallis test also relies on scores being ranked from lowest to highest. In other words, the group with the lowest mean rank is the group with the greatest number of lower scores in it.

Table 4.12: Mean Ranks (Kruskall-Wallis test)

	Ao_oa_r	N	Mean Rank
REWORK	ao	101	72.68
	oa	17	60.21
	r	20	61.33
	Total	138	
NEWWORK	ao	101	73.37
	oa	17	69.00
	r	20	50.38
	Total	138	
OUTWORK	ao	98	70.47
	oa	17	65.21
	r	19	54.21
	Total	134	
ALLPWORK	ao	101	73.97
	oa	17	62.21
	r	20	53.13
	Total	138	

The second SPSS output, table 4.13, provides the actual test statistics for the Kruskall-Wallis test. For all the data groups, the Kruskall-Wallis test is non-significant at 0.05 level ($p>0.05$) among the three decision categories. This indicates that ranking of the three groups, adaptive reuse –both to and from office, and renovation, are not significantly different from each other in the extent of physical workload that they require.

Table 4.13: Test Statistics (Kruskall-Wallis test)

	REWORK	NEWWORK	OUTWORK	ALLPWORK
Chi-Square	2.436	5.652	2.992	5.195
df	2	2	2	2
Asymp. Sig.	.296	.059	.224	.074

a. Kruskal Wallis Test

b. Grouping Variable: ao_oa_r

Figure 4.4 is a clustered bar chart and is used to visualize the pattern shown in Kruskall-Wallis test. As clearly seen from the chart, all repeated measures (different types of physical work required) are higher in the adaptive reuse –to office group than the other two groups, meaning that the extent of workload required for each physical work is a lot more for adaptive reuse –to office group than it is for the other two groups. However, according to the Kruskall-Wallis test, none of the category rankings are significant at the 0.05 level. Since the number of cases is not enough to produce meaningful statistical results, each individual physical work category is analyzed only with simple descriptive statistics and presented in the following table.

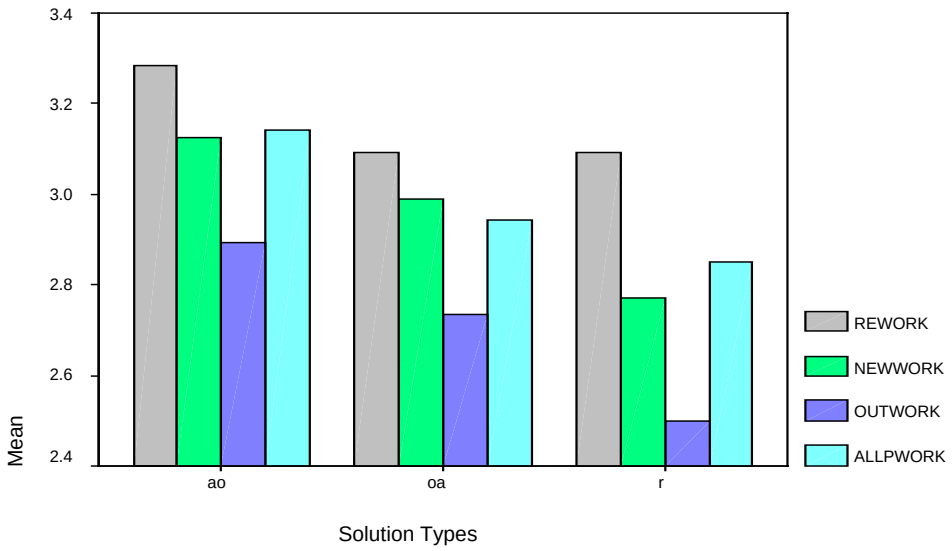

Figure 4.4: The Extent of Physical Workload Required for each Solution Type

Table 4.14 illustrates the difference among renovation, adaptive reuse (to office) and adaptive reuse (from office) type of decisions based on the average mean scores of each decision category. For some of the physical work categories a reevaluation of the average mean scores is made based on the standard error of mean and standard deviation calculations of each category, to better acknowledge the larger variation among the cases. As the table shows, for all three groups, the extent of physical workload required in new interior construction and mechanical work categories are extensive. Besides all three groups are in agreement that for exterior restoration and interior demolition, there is a moderate level of physical workload required.

On the other hand, there seems to be a difference in the extent of physical workload required in new exterior construction, structural and site restoration types of work between the renovation and both of the adaptive reuse groups. For half of the physical work categories minor level of workload seems to be sufficient for the renovation group, while both types of adaptive reuse groups typically require at least a moderate level of physical workload in each category.

Table 4.14: The Extent of Physical Workload Required

Physical Work Categories	Renovation (n=20)	Adaptive Reuse to office (n=101)	Adaptive Reuse from office (n=18)
Exterior Restoration	Moderate	Moderate	Moderate
New Exterior Construction	Minor[1]	Moderate	Moderate
Structural	Minor[2]	Moderate	Moderate
Mechanical	Extensive	Extensive	Extensive
Interior Demolition	Moderate	Moderate	Moderate
New Interior Construction	Extensive	Extensive	Extensive
Environmental Remediation	Moderate	Moderate	Minor
Landscaping	Minor	Minor[4]	Moderate
New Facilities, Parking	Minor	Moderate	Minor
Site Restoration	Minor[3]	Moderate	Moderate

[1] Reevaluated based on the ± .193 standard error of mean, and ± .841 standard deviation scores with an initial mean score of 2.677.

[2] Reevaluated based on the ± .154 standard error of mean, and ± .688 standard deviation scores with an initial mean score of 2.526.

[3] Reevaluated based on the ± .221 standard error of mean, and ± .961 standard deviation scores with an initial mean score of 2.500.

[4] Reevaluated based on the ± .117 standard error of mean, and ± .919 standard deviation scores with an initial mean score of 2.579.

4.4.2 The Extent of Physical Workload Required in relation to the Age Range

When it comes to the extent of physical work required in relation to the age, figure 4.5 is used to illustrate the levels of physical work for each age category. The x-axis represents the average mean of each physical work group. Scores between 2 to 2.49 show the need for a minor level of workload, 2.50 to 3.49 show the need for a moderate level of workload and 3.50 to 4.00 show the need for an extensive level of workload.

Figure 4.5 demonstrates that as the building ages, the extent of new construction work (*newwork*) required decreases, while the extent of out-of-building work (*outwork*) required increases. In other words, among the cases included in this study, as the building gets older more out-of-building work (*outwork*) but lesser new construction work (*newwork*) was performed on the facility. As a result, the extent of new construction work (*newwork*) requirement is the highest for the youngest age group, whereas the extent of out-of-building work (*outwork*) is the highest for the oldest age group.

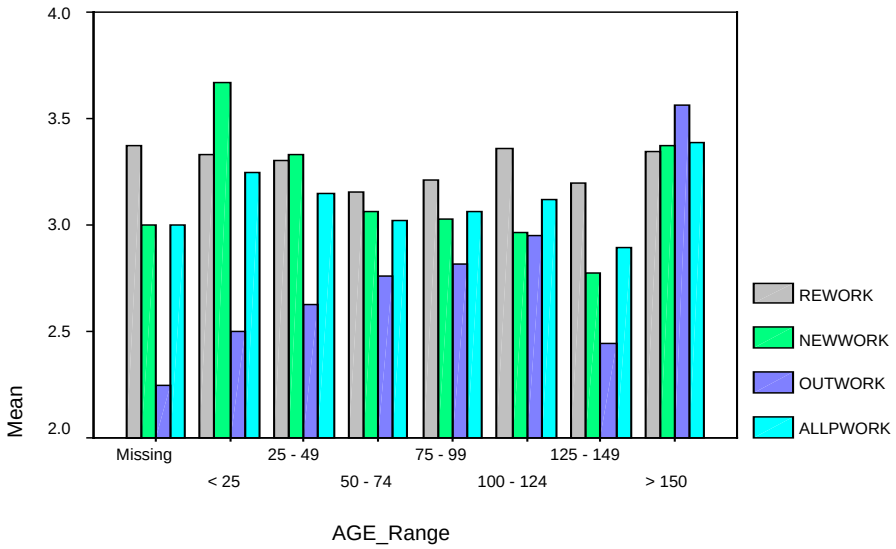

Figure 4.5: The Extent of Physical Workload Required in relation to the Age Range

In line with the previously conducted review of literature, the emphasis on the new construction work (*newwork*) can probably be best explained by the ever-increasing pressure faced mostly by the newer buildings to keep up with the market. Then again, the significance of out-of-building work (*outwork*) in relation to aging naturally increases as the building ages. Yet, the extent of restoration work (*rework*) is rather similar for each age group.

To further inquiry whether the differences among various age groups are significant at .05 level another Kruskall-Wallis test is carried out. Following are the two outputs of this test. First output, table 4.15, shows the mean rankings of the various age groups and second output, table 4.16, demonstrates the actual test results.

The mean rankings for each of the age groups illustrate the exact pattern revealed in Figure 4.5, indicating that among the studied cases the extent of required new construction work (*newwork*) is decreasing, while the extent of required out-of-building work (*outwork*) is increasing throughout their aging process. Here, once again, the imbalances among the number of cases involved in each group should be kept in mind and considered as a limitation of the outputs.

Table 4.15: Mean Ranks (Kruskall-Wallis test)

Physical Work	Age Range	N	Mean Rank
REWORK	< 25	2	75.00
	25 - 49	8	72.63
	50 - 74	40	62.89
	75 - 99	47	67.45
	100 - 124	22	75.77
	125 - 149	9	68.11
	> 150	8	77.44
	Total	136	
NEWWORK	< 25	2	111.50
	25 - 49	8	87.63
	50 - 74	40	70.84
	75 - 99	47	65.00
	100 - 124	22	61.11
	125 - 149	9	51.17
	> 150	8	87.31
	Total	136	
OUTWORK	< 25	2	50.50
	25 - 49	8	56.69
	50 - 74	38	64.03
	75 - 99	47	65.34
	100 - 124	20	72.32
	125 - 149	9	52.94
	> 150	8	99.56
	Total	132	
ALLPWORK	< 25	2	82.50
	25 - 49	8	73.50
	50 - 74	40	64.47
	75 - 99	47	65.87
	100 - 124	22	72.27
	125 - 149	9	59.67
	> 150	8	95.13
	Total	136	

Kruskall-Wallis test indicates that there are no differences among any of the physical work categories at the 0.05 significance level (Table 4.18). In other words, the mean rank order of each physical work category is similar for each decision group.

Table 4.16: Test Statistics (Kruskall-Wallis test)

	REWORK	NEWWORK	OUTWORK	ALLPWORK
Chi-Square	2.185	9.322	9.050	5.326
df	6	6	6	6
Asymp. Sig.	.902	.156	.171	.503

a. Kruskal Wallis Test
b. Grouping Variable: AGERG

Following table, table 4.17, presents the extent of each physical work category in relation to the age of a building based on their average mean scores. Similarly, for some of the physical work categories a reevaluation of the average mean scores is

made based on the standard error of mean and standard deviation calculations of each category, to better acknowledge the larger variation among the cases.

As seen from the table, for all age categories, mechanical work requires an extensive amount of workload, whereas structural type of physical work requires a moderate level of workload. The extent of physical workload is higher for the younger age groups, <25 years and 25-49 years, in exterior restoration and new exterior construction categories, while interior demolition work is highest for the oldest age group, with ages over 150 years.

Table 4.17: The Extent of Physical Workload Required in relation to the Age Range

Physical Work	<25* (n=2)	25-49* (n=8)	50-74* (n=40)	75-99* (n=47)	100-124* (n=22)	125-150* (n=9)	>150* (n=8)
Exterior Restoration	Extensive	Extensive[1]	Moderate	Moderate	Moderate	Moderate	Moderate
New Exterior Construction	Extensive	Moderate	Moderate	Minor[3]	Minor[4]	Moderate[8]	Moderate
Structural	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Mechanical	Extensive	Extensive	Extensive	Extensive	Extensive	Extensive	Extensive
Interior Demolition	N/A	Moderate	Moderate	Moderate	Moderate	Moderate	Extensive
New Interior Construction	Extensive	Extensive	Extensive	Extensive	Extensive	Moderate	Extensive
Environmental Remediation	Minor	Moderate	Moderate	Moderate	Moderate	Minor	Minor
Landscaping	N/A	Minor	Minor[2]	Moderate	Minor[5]	Minor	Extensive
New Facilities, Parking	Extensive	Moderate	Moderate	Moderate	Minor[6]	Moderate	Extensive[9]
Site Restoration	Moderate	Moderate	Moderate	Moderate	Moderate[7]	Moderate	Extensive

[1] Reevaluated based on ± .359 std. error of mean, ± .951 std. dev. scores with an initial mean of 3.285.

[2] Reevaluated based on ± .233 std. error of mean, ± 1.121 std. dev. scores with an initial mean of 2.565.

[3] Reevaluated based on ± .133 std. error of mean, ± .876 std. dev. scores with an initial mean of 2.604.

[4] Reevaluated based on ± .176 std. error of mean, ± .810 std. dev. scores with an initial mean of 2.571.

[5] Reevaluated based on ± .266 std. error of mean, ± .960 std. dev. scores with an initial mean of 2.615.

[6] Reevaluated based on ± .256 std. error of mean, ± 1.147 std. dev. scores with an initial mean of 2.5.

[7] Reevaluated based on ± .216 std. error of mean, ± .967 std. dev. scores with an initial mean of 3.1.

[8] Reevaluated based on ± .242 std. error of mean, ± .726 std. dev. scores with an initial mean of 2.444.

[9] Reevaluated based on ± .297 std. error of mean, ± .786 std. dev. scores with an initial mean of 3.428.

4.5 Cost/square meter (cost/sqm) versus Rent/square meter (rent/sqm)

Once the extent of physical workload required in relation to each solution type and age range is identified, next a similar approach is taken to understand the cost/sqm spent and rent/sqm achieved in relation to the solution type and age range. As explained earlier in the methodology section, cost/sqm data involves both the approximate redevelopment and building acquisition costs per gross area of the building.

4.5.1 Cost/sqm versus Rent/sqm in relation to the Solution Type

When the average cost per square meter (*cost/sqm*) and average rent per square meter (*rent/sqm*) is compared in relation to the solution type, it is clear that whatever the solution is, the achievable rent/sqm is almost constant among all three groups and is a lot lower than the cost/sqm. Moreover, figure 4.6 points out that the average cost/sqm of converting an office space into a completely different use is almost twice the average cost/sqm of other two alternatives.

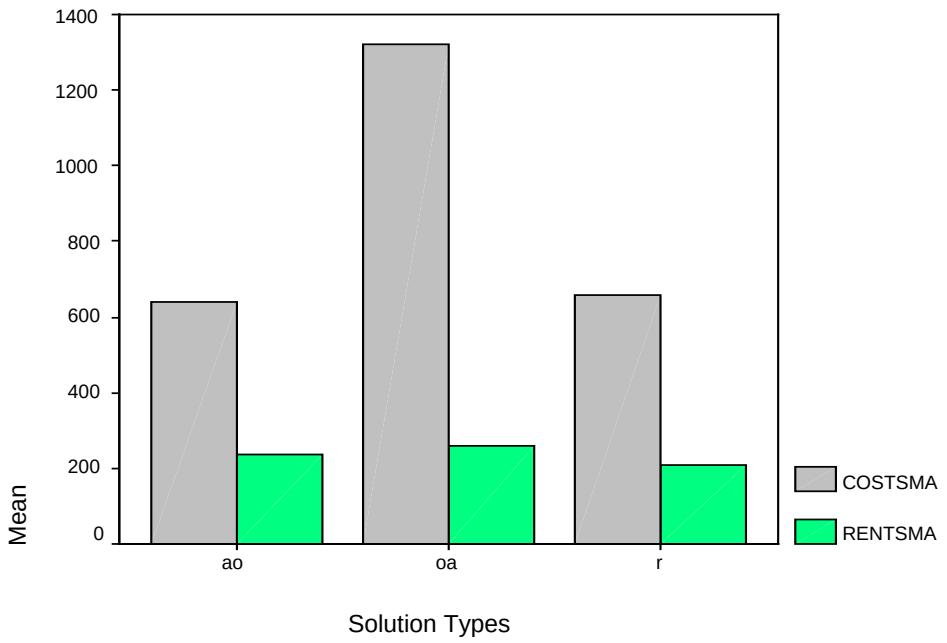

Figure 4.6: Cost/sqm versus Rent/sqm in relation to the Solution Type

4.5.2 Cost/sqm versus Rent/sqm in relation to the Age Range

On the other hand, when the average cost/sqm and the average rent/sqm is analyzed in relation to the age range, it is examined that the average rent/sqm achieved varies slightly among the different age groups. Whilst, the average cost/sqm significantly diverges among the age groups, being at its highest level between 50-74 and 75-99 years of age –almost twice the average cost/sqm of buildings between 25-49 years of age, and triple the average cost/sqm of buildings between 125-149 years of age.

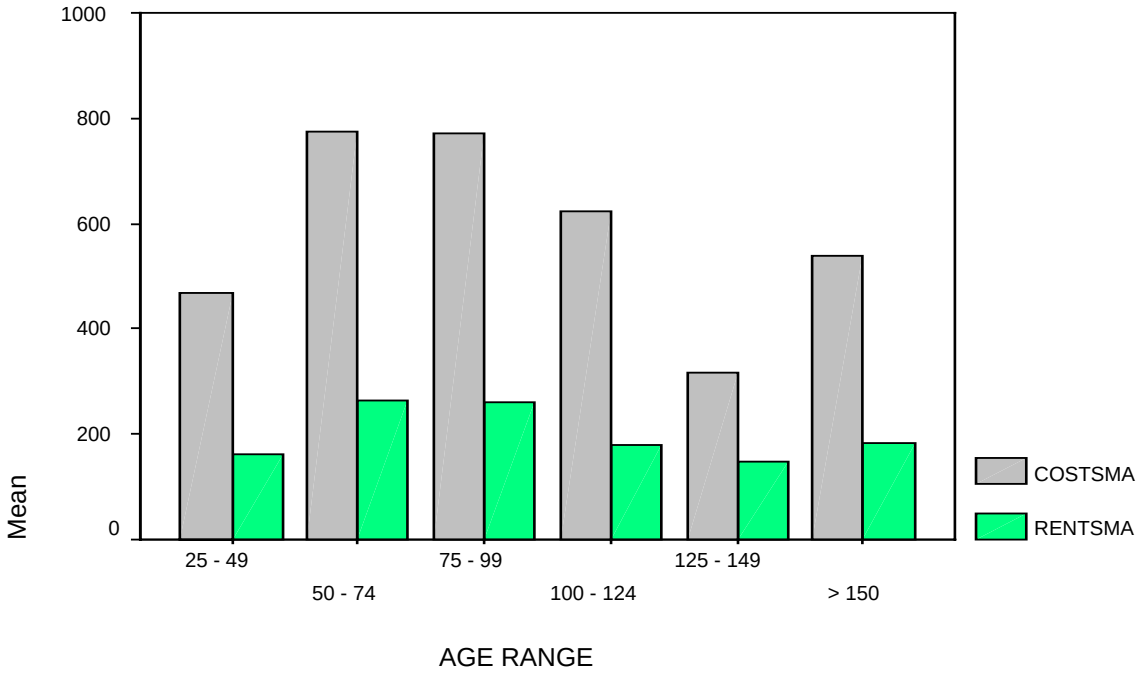

Figure 4.7: Cost/sqm versus Rent/sqm in relation to the Age Range

4.6 Acquisition and Development Costs

In the same way, acquisition and development costs are analyzed in relation to the solution type and age range. Both the acquisition and development costs discussed here are overall, or in other words total, costs. Following are the findings of these analyses.

4.6.1 Acquisition and Development Costs in relation to the Solution Type

As displayed in figure 4.8, average development cost is approximately five times the acquisition cost for all solution types. Similar to the cost/sqm vs. rent/sqm findings in

relation to the solution types, both acquisition and development costs are lower for renovation than the other two adaptive reuse alternatives.

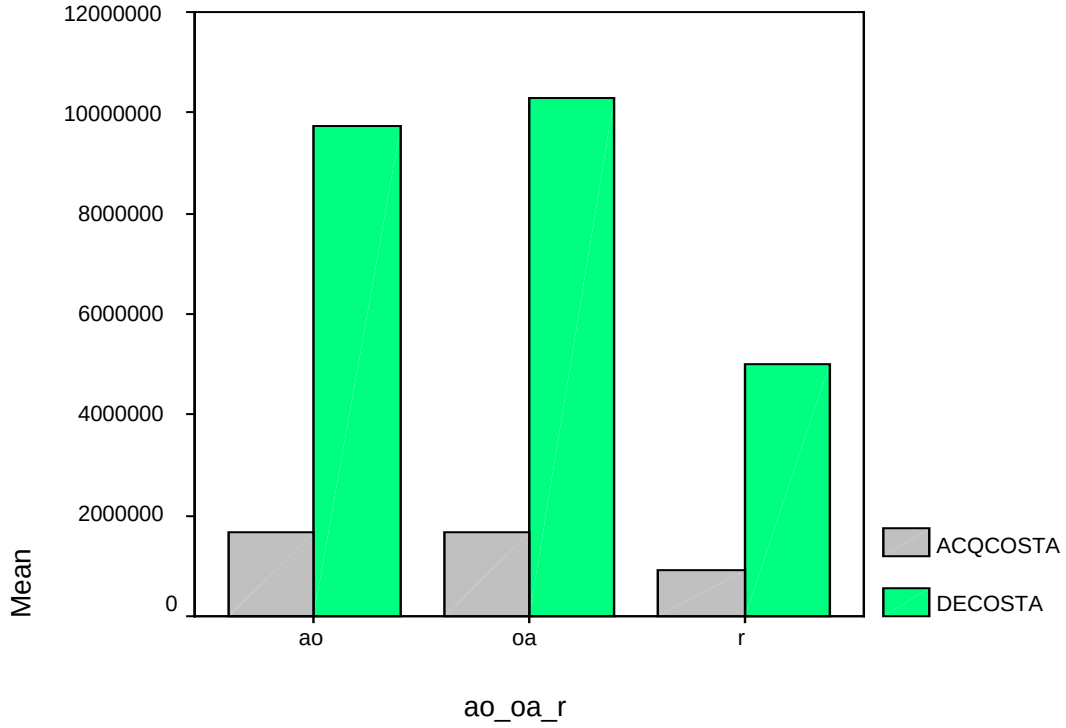

Figure 4.8: Acquisition and Development Costs in relation to the Solution Type

4.6.2 Acquisition and Development Costs in relation to the Age Range

Correspondingly, acquisition and development costs in relation to the age range are analyzed in figure 4.9. Interestingly, the buildings that have the highest average development cost fall under the <25 years of age category. However, although the average development cost is the highest for the youngest age category, the number of cases included is only 2, thus limiting the validity of the outcome.

The second highest average development cost falls under the 75 - 99 (n=47) age category. Additionally, it is surprising to see that development cost actually begins to decrease once the buildings hit and exceed the 100-year threshold and the overall number of cases that support this finding is 39 buildings collectively (100-124, n=22; 125-149, n=9; >150, n=8).

On the other hand, when it comes to the acquisition cost, once again surprisingly, adjusted average acquisition costs are the highest for the newer buildings that are less than 50 years of age and begin to decrease as the buildings reach and exceed the 100 years of age threshold.

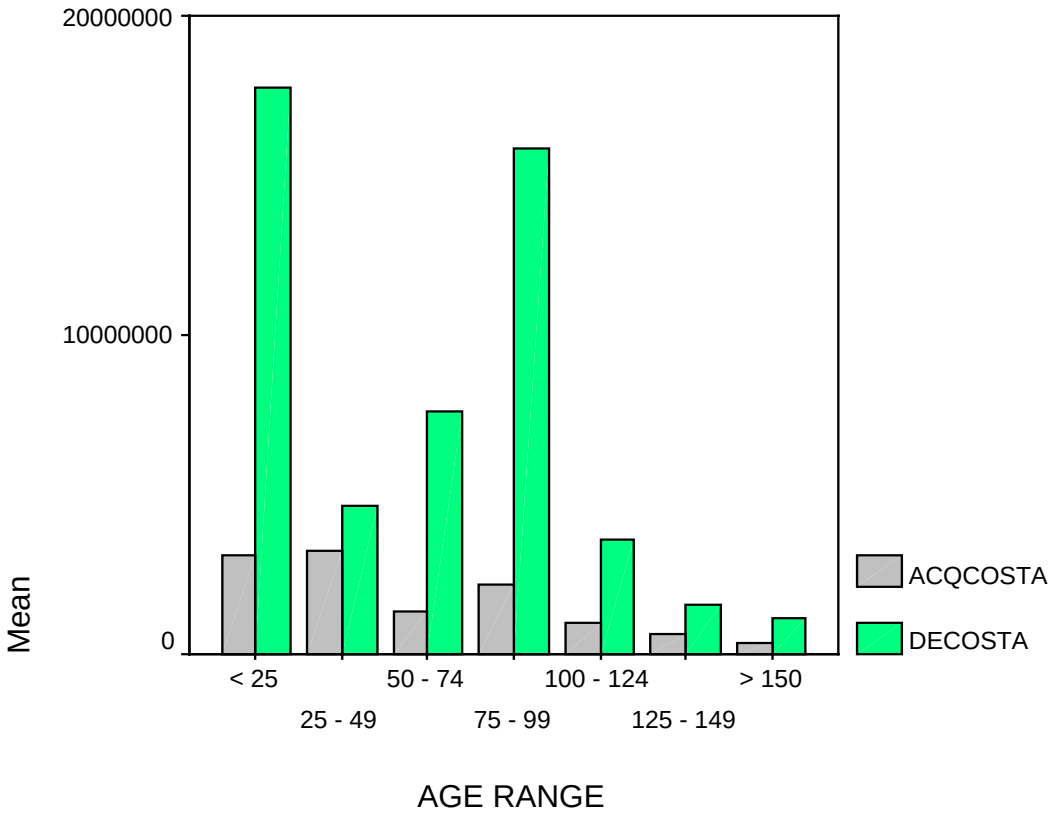

Figure 4.9: Acquisition and Development Costs in relation to the Age Range

4.7 Acquisition Type and Financing Source

Finally, similar analyses are applied for the acquisition type and financing source in relation to the solution type and age range of the cases used in this study.

4.7.1 Acquisition Type and Financing Source in relation to the Solution Type

Following is a bar chart showing the acquisition types for each alternative solution. As figure 4.10 illustrates for all of the three solutions most common acquisition type is the purchase of the facility. Second highest acquisition type for renovation and adaptive reuse –to and out of office is long-term lease, followed by the already owned acquisition type, respectively. As always, the imbalance in the sample sizes of

the solution types (renovation and adaptive reuse –to and out of office use) should be taken into account while analyzing the chart.

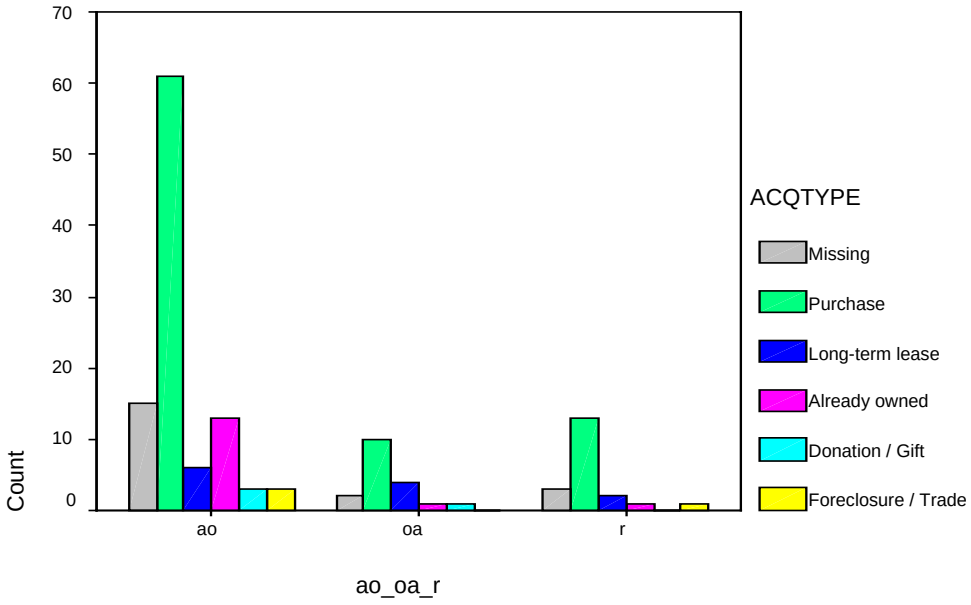

Figure 4.10: Acquisition Cost in relation to the Solution Type

Figure 4.11 demonstrates the relation between the financing source and the solution type. However, before beginning to evaluate the results, it is once again important to point out that there is an imbalance in the sample sizes of each solution type. Thus, the findings cannot be generalized.

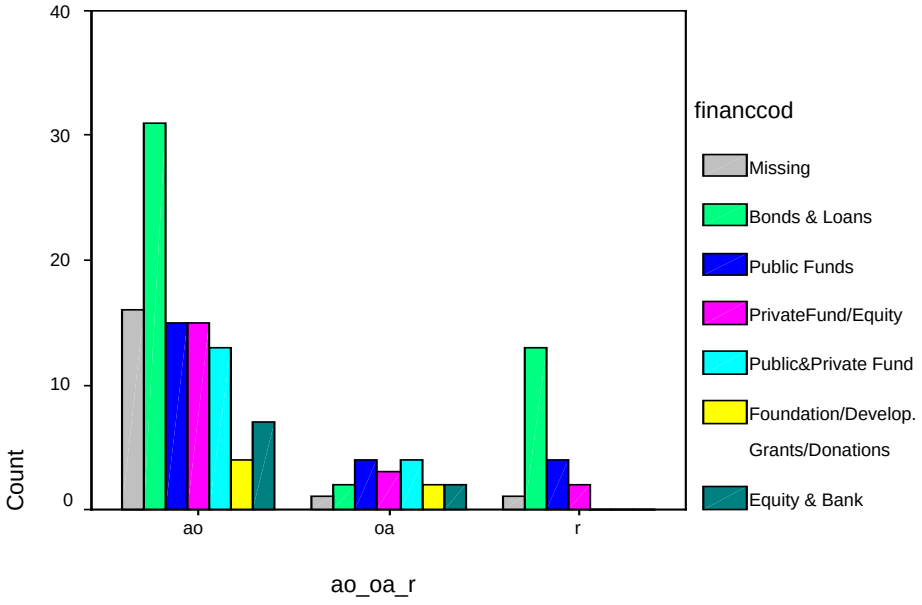

Figure 4.11: Financing Source in relation to the Solution Type

The bar chart shows that for the two adaptive reuse categories all of the financing sources have been used to acquire the buildings in varying frequencies. However, for the adaptive reuse –to office solution type (n=101) the most commonly used financing source is the bonds & loans option, while the least used source is the foundation/development grants and donations option. On the other hand, for the adaptive reuse category –from office solution type (n=18) public funds and public & private funding are the two more commonly used financing sources among other options. When it comes to the renovation category (n=20), out of six financing sources only three of the options –the bonds & loans, public funds and private funds & equity, are being used. Among them, similar to the adaptive reuse –to office, bonds & loans option is found to be the most frequently preferred alternative.

4.7.2 Acquisition Type and Financing Source in relation to the Age Range

Lastly, similar descriptive analyses are applied in relation to the age range. Figure 4.12 illustrates the first of these analyses, where the relation between acquisition type and age range is sought. Again, unfortunately, there is unevenness among the number of cases in each age category. However, the overall picture shows that purchase is the most common acquisition type for all ages. Moreover, for the buildings less than the age of 50, purchasing seems to be the only acquisition type that is being used among the cases analyzed. For the buildings older than age 125, besides purchasing already owned option is the second and the only other used acquisition type.

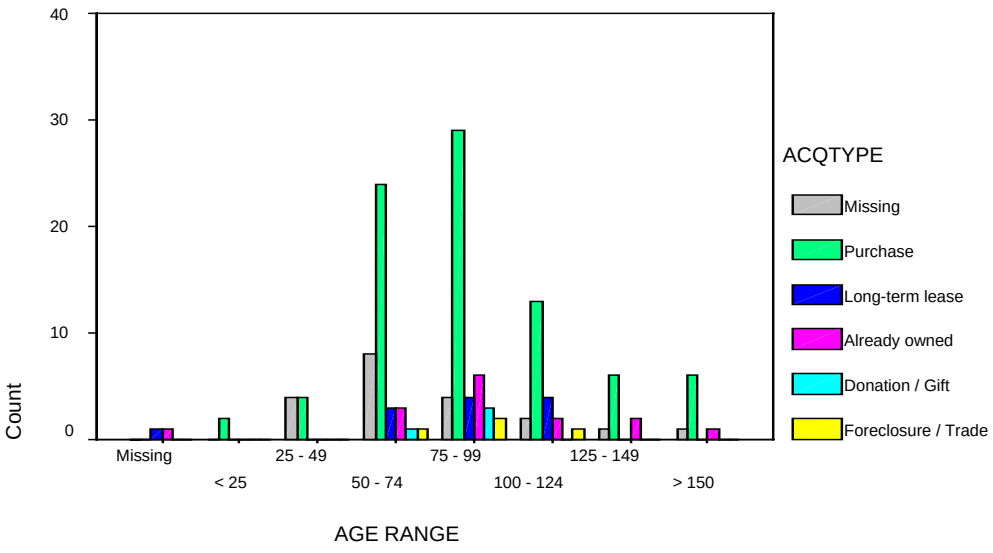

Figure 4.12: Acquisition Type in relation to the Age Range

Subsequently, figure 4.13 demonstrates the relation between the financing source and the age range. Similar to the solution type - financing source relation bar chart (figure 4.8), bonds & loans is once again the most frequently used option for all ages. Only the buildings between 50 – 100 years of age seem to be using all of the listed financing sources.

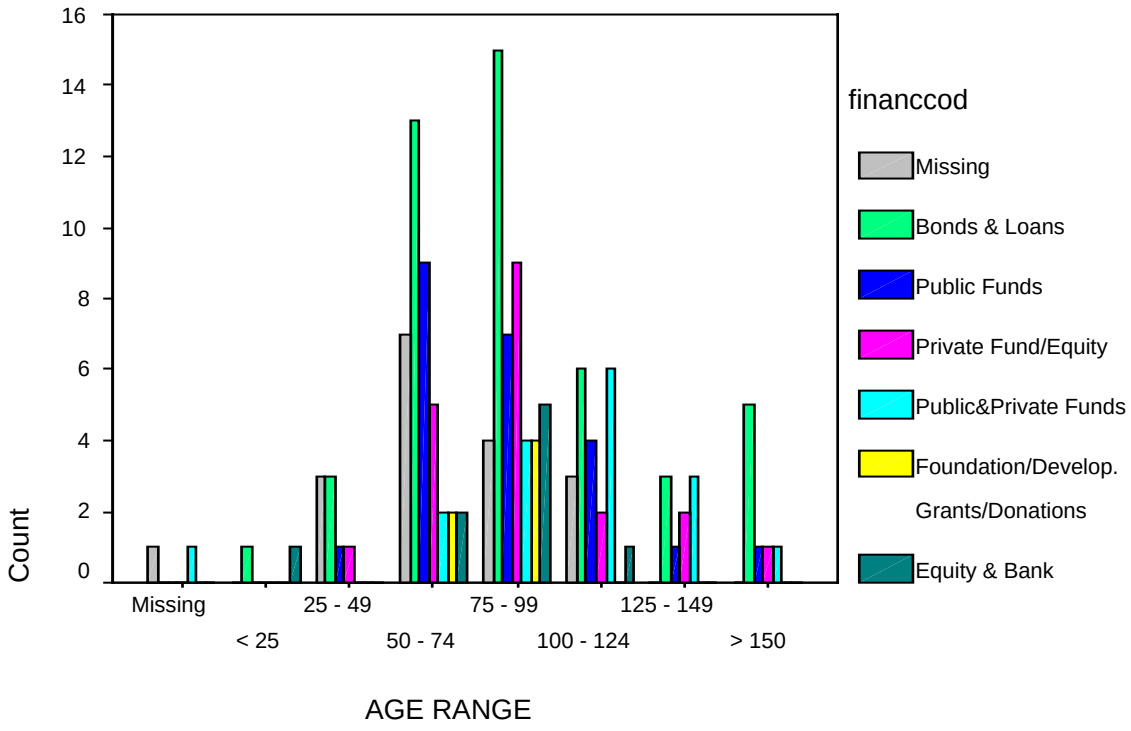

Figure 4.13: Financing Source in relation to the Age Range

5. CONCLUSION: A DECISION-TREE APPROACH

The purpose of this chapter is to summarize the findings of the study and propose a decision-tree approach derived from the findings of the two datasets used for this research. Next, the strengths and weaknesses of the proposed decision-tree are discussed and further research areas are proposed.

In summary, the findings of the study show that there are certain problems being encountered in the aging process of a building. Although these problems differ slightly among alternative solution types, the ultimate concern for making a final decision is the availability of a strong market demand for the subject product/estate at hand.

For an office building if there is an existing and strong market demand for its use, renovation of the building seems to be typically considered as the first and most viable solution alternative, as it is cheaper than most of the other options. Renovation decision is usually made when the class of the building begins slipping into Class B or C for various reasons and thus needs to be reinstated to a Class A image by improving the quality of the building.

Adaptive reuse solution is chosen when the market demographics seem to be shifting and subject use is no longer demanded by the market. The change of use option is practiced to prevent the real estate from losing its value and reclaim its status in the market by being demanded through another use.

The results of the study suggest that there is an association between the original (old) use and the converted (new) use of a building. New uses are mostly converted from industrial and residential facilities, into office and mixed use with office options. The overall extent of physical workload required is the highest for adaptive reuse –to office, and the lowest for renovation. For all solution types the extent of physical workload required was highest for the restoration work (rework), followed by the new construction work (newwork) and out-of-the building work (outwork),

respectively. Moreover, for all solution types, mechanical and new interior construction works require extensive care, while exterior restoration and interior demolition works require moderate level of care.

Furthermore, the extent of physical workload required remains constant for restoration work (rework), decreases for new construction work (newwork), and increases for out-of-the-building work (outwork) as the building ages. Additionally, for all age categories, mechanical work is required extensively, while structural work is required on a moderate level.

Cost spent per square meter is similar for adaptive reuse –to office and renovation alternative, and approximately half of adaptive reuse –from office option. However, rent achieved per square meter is similar for all of the three solution types. In other words, payback period for adaptive reuse –from office is almost twice longer than the other two alternatives, assuming that cost of the development would only be paid back with the use of rental revenue generated from the facility. Meanwhile, both cost and rent per square meter are the highest for the buildings between 50-99 years of age.

On the other hand, when the figures for the development and acquisition costs are analyzed it is found out that development cost is slightly higher for adaptive reuse –from office than adaptive reuse –to office, and is almost twice the renovation cost. Acquisition cost is similar for both adaptive reuse types, and correspondingly almost twice the renovation cost. Besides, acquisition cost is approximately $1/5^{th}$ of the development cost for all solution types.

The buildings aged less than 25 years and buildings in between 75-99 years of age incur the highest development costs, while surprisingly buildings older than 150 years incur the lowest development costs. In addition, acquisition costs are the highest for buildings aged less than 50 years and the lowest for the buildings that are older than 150 years.

Lastly, for all solution types and age categories purchasing is found to be the most common acquisition type and is mostly financed by bonds & loans, public funds, and private funding.

Subsequently, the findings of the study are used to formulate the decision-tree proposed in figure 5.1. In this study, the strength and uniqueness of the decision-tree approach is believed to lie in the fact that, contrary to the other decision-making models currently available, the real estate is perceived and accepted as a valuable corporate asset. With this study, an attempt is made to provide the corporate real estate owner, who may or may not have any real estate and/or facility management background, with all the available solutions, once the building begins to show signs of obsolescence. However, even though the initial goal of this study was to develop a timeline-integrated decision-tree, this objective had to be abandoned due to the fact that findings of the study did not support a relation between the decisions that need to be made and their timing, more specifically the age of the buildings.

The findings suggest that in today's world to be able to maintain a competitive edge, excessive physical work with rather high development costs should be expected regardless of the age of a building. Contrary to the common belief, buildings younger than 25 years of age are actually the most likely targets of rapid value depreciation and thus, require constant attention and improvement if they were to stay in the game. Market demographics and consumer demands are the driving factors for change and therefore should be carefully assessed and regularly revised.

Figure 5.1 starts with a list of the typical problems that are being encountered by facilities throughout their aging process/life cycle as identified in the findings section of this study. At this point, the owner of the real estate has two options. He/she can either ***ignore*** these problems and keep using the building as it is or ***acknowledge*** the problems being encountered and prepare to make some sequential decisions regarding these problems. Ignoring the problems can only be a viable option if the value of the benefits expected from the subject building exceeds the cost of keeping to use the building as it is. Although this is the least expensive alternative, in time this decision might be a choice that would bring more harm than good to the owner of the building, as unattended problems typically lead to bigger and more expensive problems. However, if the owner decides to face these problems, believing that the cost of keeping the subject building in its existing condition is higher than the value of the expected benefits from the building, he/she has three options: ***to keep***, ***to sell/rent***, or ***to demolish*** the building. As seen in the figure, each option has several more alternative sub-categories.

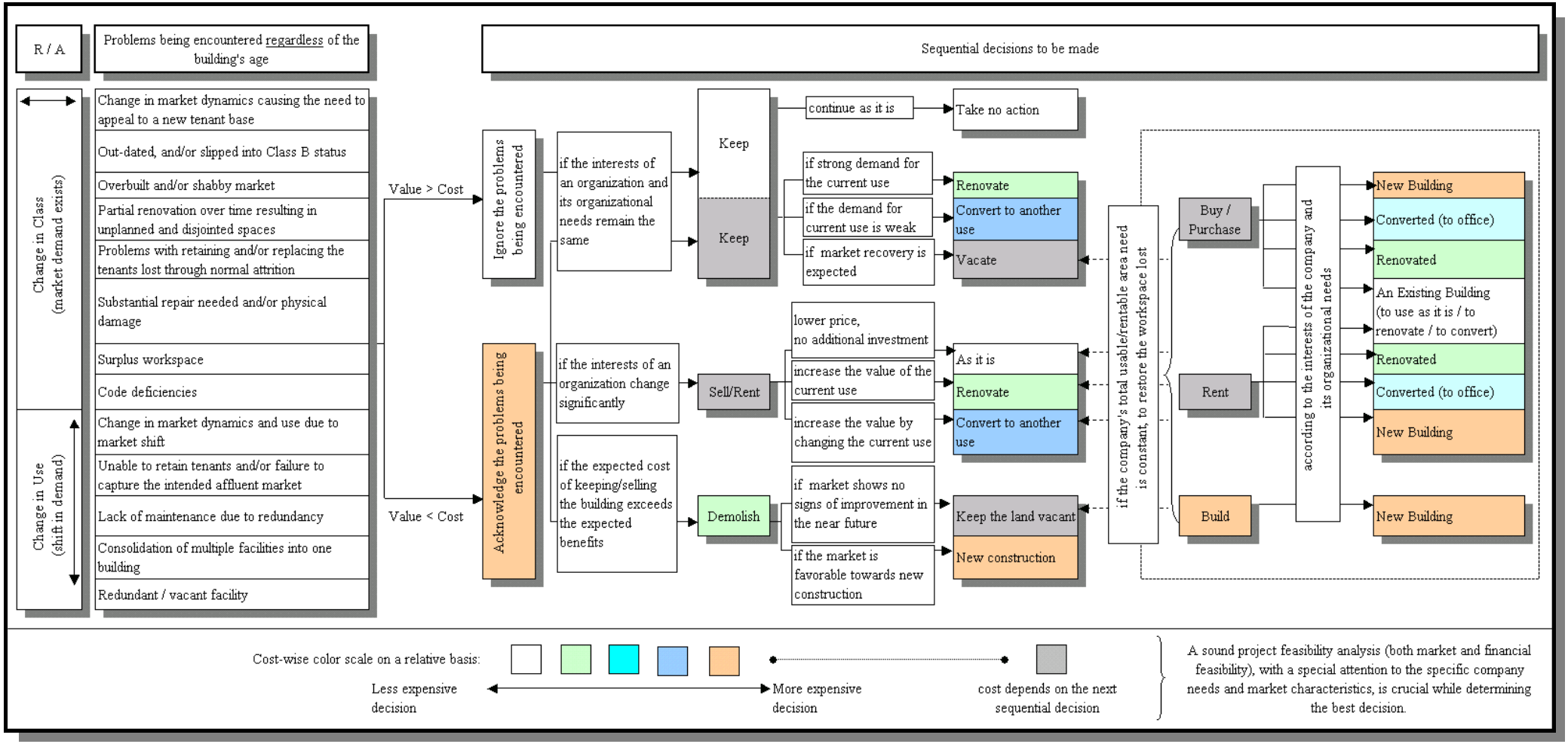

Figure 5.1: A Decision-Tree Approach To Prevent Office Building's From Getting Obsolete

If the building is going to be ***kept***, depending on the nature of the problem, one option might be ***to vacate*** the building till the market recovers and a stronger demand reoccurs for the existing use. This option assumes a vital market shift that leaves the building with the inability to retain/replace its tenant base. Consistent with the findings of the study, depending on the market demand and the problems being encountered, other two possibilities are to either ***renovate*** or ***adaptive reuse*** the building. In case of a strong demand in the market for the current use, renovation is preferred where only quality improvement within the same use is sought. However, if the demand for the current use is weak, a change in use is preferred where a new use that has a promising demand is sought. The findings of the study show that latter option is relatively more expensive than the former option. However, findings of the study also show that, if the market characteristics and organizational needs are analyzed properly, targeted benefits (high rental and occupancy rates) are achieved for both alternatives (renovation & conversion) regardless of this cost difference.

If the building is going to be ***sold/rented***, the owner can liquidate the estate ***as it is*** for possibly a much lower price than its real attainable value. Besides if this approach is taken, the problems are transferred to the new owner without making any additional investments. Similarly, depending on the behavior of the market and the current structure of the organization, other options available in selling the office building are to increase its value by either ***renovating*** (by keeping its current use) or ***converting*** (by changing its current use) the building before the sale. These two approaches are mostly chosen when the interests of an organization change significantly. Most times the change might occur because of a merger or a downsizing decision affecting its corporate real estate structure and/or positioning. Once again according to the findings of the study, latter option is relatively more expensive than the former option.

The third and last option an owner might consider, if he/she decides to acknowledge the problems being encountered, is ***to demolish*** the building. This option is typically chosen when the expected cost of keeping and/or selling the building exceeds the expected benefits, while the location of the site is still believed to be favorable. Here once again the owner is faced with two different choices: He/she can ***keep*** the land vacant or ***develop*** something new once the land is cleared. At this point, the decision

should depend solely on the market characteristics. If the market does not show any signs of improvement in the near future, the first alternative should be chosen. However, if the market seems to be favorable towards new construction, second alternative should be the ultimate decision.

With the assumption that the need for the subject building, at least on a square footage basis, is constant for the corporation, and if and when any of the decisions that affect the total usable/rentable area -like keeping but vacating the property, or selling the building, or demolishing the building but keeping the land vacant- is chosen, some additional decisions are needed to be made to reinstate the exact amount of workspace lost. As the findings of the study suggests these acquisition alternatives include ***buying/purchasing*** or ***renting*** a ***new***, a ***renovated***, a ***converted*** or an ***existing*** office building (that can be used as it is or after a renovation or a conversion), or ***building/developing*** a new facility at another location. Among these alternatives, as previously conducted review of literature suggests, for most of the markets, developing a new facility will be the most expensive alternative a decision-maker can choose, followed by buying/purchasing a new building. An important difference between buying/renting a renovated/converted building and buying/renting an existing building that needs renovation / conversion is the initial investment. If the company has a reliable and knowledgeable in-house real estate consultant, buying/renting an existing building that meets the needs of the company can be a more cost-effective and viable solution. However, if the company does not have a knowledgeable real estate agent in-house, then an already renovated/converted building might be the most feasible solution than buying/developing a brand new building in a highly saturated market.

In conclusion, as J. A. Gause (1998) articulates certain market conditions tend to favor investment in improvements to existing buildings. The most common of these is when the demand for higher-quality space is growing but the capacity to add new space is limited. When a large inventory of older buildings is also available, this market situation is likely to spark a great deal of renovation activity. Another common market situation favoring investment in existing buildings is when the demand for higher-quality space is expanding and a substantial number of older buildings are well located to serve this demand but have very limited marketability in their current condition.

Many older, marginally low-quality buildings are well located and structurally sound, and offer floor plates and other design features sought by prime tenants. Their current lack of competitiveness imposes severe penalties in rent and occupancy. Many owners of such buildings will find it attractive to undertake the improvements that will enable them to compete at higher rent levels and to attain higher occupancy levels. A property with a low acquisition price can be improved yet still offer lower rents than newer buildings with heavy debt burdens. Rents that are often 10 percent below asking rents at new buildings with similar amenities will do much to win over Class A tenants (Gause, 1998).

Winning approach for corporate real estate ownership involves objectively assessing the property, getting a clear picture of the building's problems and advantages, and incorporating high-quality design to solve problems and make the most of these advantages. These processes are all central to maintaining the competitive edge of the organization and achieving the ultimate goals of facility management.

Figure 5.1 provides such a decision-tree approach that is formulated as an aid for decision-makers while managing their corporate real estates as assets. In addition to the proposed approach, supplementary results outlined in the findings chapter should be used while determining the ultimate decision, as they may provide invaluable information regarding the extent of the physical work required and the potential costs related.

Suggestion for Further Study

As mentioned repeatedly throughout the findings chapter, the imbalance in the number of cases among different solution types and age categories is believed to limit the outcome of this study. Thus, a similar research conducted with a larger number of case studies is proposed as a further study. However, it is believed that it is vital to be able to maintain a certain and consistent detail level for each and every case study. That is why, military or governmental offices should be targeted as the data provider –like initially intended for this study but failed to be pursued due to certain time constraints.

REFERENCES

Ball, R., 1999. Developers, Regeneration and Sustainability Issues in the Reuse of Vacant Industrial Buildings, *Building Research & Information*, **27**(3), 140-148.

Ballesty, S. and Orlovis, M., 2004. Life Cycle Costing and Facility Management, *FM Magazine*, **12**(2), 1-5.

Bogdan, R.C., and Biklen, S.K., 2003. *Qualitative Research For Education: An Introduction to Theory and Methods*. (4th ed.). Boston: Allyn and Bacon.

Byrne, J.A., 1992. Management's New Gurus, In *Facilities Management and the Business Of Space*, pp. 21, Arnold Publications, London.

Duffy, F. and Tanis, J., 1993. A Vision of the New Workplace, In *Facilities Management and the Business of Space*, pp. 21-23, Arnold Publications, London.

Field, A., 2000. Discovering Statistics Using SPSS for Windows, Sage Publications: London.

Firestone, W., 1987. Meaning in Method: The Rhetoric of Quantitative and Qualitative Research. *Educational Researcher, 16*(7), 16-21.

Gause, J.A. et al., 1996. New Uses for Obsolete Buildings, Urban Land Institute, Washington, D.C.

Gause, J.A. et al., 1998. Office Development Handbook, Urban Land Institute, Washington, D.C.

Glaser, B.G., and Strauss, A.L., 1967. The Discovery of Grounded Theory. In S. B. Merriam, *Qualitative Research and Case Study Applications in Education*. San Francisco: Jossey-Bass, 1998.

Harvey, H.K., 1989. The Facilities Manager's Reference, R.S. Means Company, Inc., Kingston, MA.

Hutcheson, J.M., 1994. The Life Cycle Economics of Buildings, *Facilities*, **12**(5), 11-15.

Iselin, D.G. and Lemer, A.C., 1993. The Fourth Dimension in Building: Strategies For Minimizing Obsolescence, National Academy Press, Washington, D.C.

Joroff, M. et al., 1993. Strategic Management of the Fifth Resource: Corporate Real Estate, In *Facilities Management and the Business of Space*, pp. 4-8, Arnold Publications, London.

Kiell, M., 1992. Commercial Renovation: How to Acquire, Renovate, and Remarket Existing Properties, NAIOP, The Association for Commercial Real Estate.

Langston, C. and Lauge-Kristensen, R., 2002. Strategic Management of Built Facilities, Butterworth - Heinemann, Oxford.

Leedy, P.D. and Ormrod, J.E., 2001. Practical Research: Planning and Design, (7^{th} ed.), Prentice-Hall, Inc., Upper Saddle River, New Jersey.

Mathison, S., 1988. Why Triangulate? *Educational Researcher, 17*(2), 13-17.

McGregor, W. and Then, D., 1999. Facilities Management and the Business of Space, Arnold Publications, London.

Merriam, S.B., 1998. *Qualitative Research and Case Study Applications in Education*. San Francisco: Jossey-Bass.

Morse, J., 1991. Approaches to Qualitative – Quantitative Methodological Triangulation. In A. J. Onwuegbuzie, Why Can't We All Get Along?

Towards a Framework for Unifying Research Paradigms. *Education, 122* (3), 518-530, 2002.

Muhlebach, R.F. and Alexander A.A., 1998. Business Strategies for Real Estate Management Companies, Eds. Lundeen, H.K. et al., Institute of Real Estate Management, Chicago.

O'Mara, M.A., 1999. Strategy and Place: Managing Corporate Real Estate and Facilities for Competitive Advantage, The Free Press, New York.

Patton, M., 1990. Qualitative Interviewing. (Ch. 7). *Qualitative Evaluation and Research Methods.* (2nd Ed.) Thousand Oaks, CA: Sage.

Selltiz, C., et al., 1959. Research Methods in Social Relations. In A. Peshkin, The Goodness of Qualitative Research. *Educational Researcher, 22*(2), 23-29, 1993.

Smith, P.R. et al., 2001. Facilities Engineering and Management Handbook: Commercial, Industrial, and Institutional Buildings, McGraw-Hill, USA.

Smith, S., 2003. Defining Facilities, In *Workplace Strategies and Facilities Management: Building in Value*, pp. 11-29, Eds. Best, R., Langston, C., De Valence, G., Butterworth - Heinemann, Oxford.

SPSS, 2001. SPSS Base 11.0 User's Guide. SPSS Inc: Chicago, IL.

Strauss, A.L. and Corbin, J., 1994. Grounded Theory Methodology: An Overview. In S. B. Merriam, *Qualitative Research and Case Study Applications In Education*. San Francisco: Jossey-Bass, 1998.

Strauss, A.L., 1987. Qualitative Analysis for Social Sciences. In S. B. Merriam, *Qualitative Research and Case Study Applications in Education*. San Francisco: Jossey-Bass, 1998.

ULI, 1978. Adaptive Use: Development Economics, Process and Profiles, Urban Land Institute, Washington, D.C.

Warwick, D.P., 1973. Survey Research and Participation Observation: A Benefit-Cost Analysis. In A. Peshkin, The Goodness of Qualitative Research. *Educational Researcher, 22*(2), 23-29, 1993.

White, J.R., 1993. The Office Building from Concept to Investment Reality, The Counselors of Real Estate and The Appraisal Institute, Chicago.

Zeckhauser, S. and Silverman, R., 1981. Corporate Real Estate Asset Management in the United States, In *Facilities Management and the Business of Space*, pp. 1-2, Arnold Publications, London.

APPENDICES

APPENDIX A: Definition of Terms

Adaptive Reuse is the process of changing a building's function to accommodate the changing needs of its users. In other words, adaptive reuse is the process by which structurally sound older buildings are developed for economically viable new uses.

As New Maintenance: The British Standards define maintenance as a combination of management, finance and engineering applied to physical assets to maximize their life. The US Department of Defense defines maintenance as retaining an asset in a specified condition.

Building Life Cycle: The building life cycle of an asset is generally thought to be equal to its economic life. This is the period of time during which the asset is able to make positive contribution to the financial position of its owners, both present and future

Comprehensive Renovation: Sometimes this type of renovation is called a "gut rehabilitation". Because of its wide scope it is impossible to achieve in an occupied building. All obsolete building systems are replaced. Usually this includes a significant upgrading of electrical service and capacity to meet today's greater needs. The cost of such a radical approach is usually at least 50 percent of the value or purchase price, and can be 100 percent or more and still be economically justified. Two-year time frames are common.

Construction Maintenance is the long-term (40-50 year) major repair and replacement of facades/windows, roofing, etc.

Cosmetic Renovation: This type of program includes no work on the actual structure of the building. It focuses on improving image, particularly in public areas. The cost of a cosmetic renovation will usually be less than 10 percent of the value or purchase price of the property. And it will usually require three months to one year.

Cyclic Maintenance involves programmed repainting, carpeting, window resealing, replacing air-conditioners, lifts, partitions, security systems, fire services, electrical machinery, etc.

Economic Obsolescence occurs when costs exceed revenue.

Facilities: Facilities are the infrastructure that supports the people in the organization in their endeavors to achieve business goals. In other words, facilities are the tools which people in the business have at their disposal to carry out their tasks.

Facility Management: Facilities management is the practice of coordinating the physical workplace with the people and work of the organization; integrates the principles of business administration, architecture and the behavioral and engineering sciences.

Functional Obsolescence is a facet of design.

Legal Obsolescence is caused by changes in statute.

Market Obsolescence: The management strategy in addressing market obsolescence is to be proactive: Fix it before it's broke; improve it before it's passé. Operational isn't enough; current is required.

Obsolescence: The condition of being antiqued, old fashioned, or out of date, resulting when there is a change in the requirements or expectations regarding the shelter, comfort, profitability, or other dimension of performance that a building or building subsystem is expected to provide.

Physical Obsolescence occurs when the structure collapses or is in danger of collapsing.

Refurbishment: Building refurbishment is aimed at eliminating the effects of wear and obsolescence.

Renovation: The renovation of a structure refers to the physical upgrading of materials and support systems while retaining a building's original use.

Routine-programmed Maintenance and service includes daily cleaning, lift and air-conditioning cleaning and checks, etc.

Significant Renovation: A renovation of this scope might include all of the steps taken in a cosmetic renovation, plus many others that address deterioration or obsolescence in a facility. Major repairs are typically carried out on all building systems. The cost is usually in the range of 10-50 percent of the property's value or purchase price. The time frame may be up to two years, especially if it is being undertaken as a phased program in an unoccupied building.

Social Obsolescence means that the building fails to meet long-term human desires.

Technological Obsolescence occurs when the building is inferior to alternatives.

APPENDIX B: Major Survey Reports on Management Aspects of Operational Property

UK & Europe		
Source & Title of Report	***Survey Sample***	***Main Survey Findings***
Managing Operational Property Assets (Avis et al., 1989)	230 organizations (28.75% response rate, evenly split between private & public sector)	The overall picture was more of reactive then proactive property management. There was clear evidence that property was only seriously considered by organizations when they were under severe profit or cost constraints.
The Role of Property – Managing Cost & Releasing Value (Debenham Tewson Research, 1992)	Based on interviews with 100 major companies.	Only on rare occasions does property receive explicit treatment in corporate plans. Property is viewed as incidental, more often than an asset that requires little management, generates cost but has little or no value.
Property Management Performance Monitoring (Oxford Brookes University & University of Reading, 1993)	In-depth case study of the property monitoring procedures of three large organizations.	The report cautions that the whole area of monitoring organizational property assets is relatively new and recent research efforts are necessarily a first step towards understanding best practice and therefore, are not definitive.
The Property Cycle – The Management Issue (Ernst & Young, 1993)	Combination of telephone and interviews. Senior executives of 61 organizations comprising of three types of organizations: property funders, developers and a range of occupiers of commercial property.	Though nearly half of the occupier respondents considered the cyclical progression a major shortcoming of the property market, few had a property strategy for their operations that amounted to more than 'we'll find the space when we need it'.
Property in the Board Room – A New Perspective (Graham Bannock & Partners Ltd., commissioned by Hillier Parker, 1994)	Personal interviews with 12 finance directors and other directors of UK companies from the private sector. A postal survey of 111 property managers.	Apart from companies whose core businesses are directly tied to the property assets, the perception of the role of property is seen as a cost of business rather than a business resource that requires strategic attention by senior mgmt.

Source & Title of Report	*Survey Sample*	*Main Survey Findings*
Real Estate Resource Management (Avis et al., 1995, GTI)	155 organizations (>25% response rate, evenly split between private and public sector)	The findings establish that the real estate resource for organizations in the study is extensive, complex and dynamic. However, real estate still lags behind other key resource areas in terms of attention given and performance achieved.
Shaping the Workplace for Profit (Gallup, commissioned by Workplace Management, 1996)	200 Financial Directors and Managing Directors / CEOs across a broad spectrum of businesses.	Given the general acknowledged link between the workplace environment, employee satisfaction and profitability, senior managers do appear to be missing an opportunity to manage the working environment for competitive advantage.
The Milliken Report: Space Futures (The Henley Center, commissioned by Milliken Carpet, 1996)	Telephone survey of 200 facilities managers and 50 architects / designers, plus 10 in-depth interviews.	Space management must play a bigger part in overall business development, becoming a strategic rather than an operational issue.
Wasted Assets? A Survey of Corporate Real Estate in Europe (Arthur Andersen, 1995)	20 companies in eight European countries in three sectors: financial services, manufacturing and retail / distribution. Based on interviews with property executives.	Many companies are missing opportunities to reduce cost and enhance performance because they give limited attention to managing their property assets.

North America		
Source & Title of Report	*Survey Sample*	*Main Survey Findings*
Corporate Real Estate Management in the U.S. (Zeckhauser & Silverman, Harvard Real Estates Inc., 1981)	300 US companies, 22% response rate. Multi-sector survey.	Despite enormous value, corporate real estate assets are under-managed.
Managing Corporate Real Estate Assets: A Survey of US Real Estate Executives (Veale, 1987, MIT)	284 organizations not primarily in the real estate business, 15% response rate.	The under-management of corporate real estate assets is hampered by lack of adequate information on the real estate portfolio and senior mgmt regarding real estate as a cost rather than as a resource.

Source & Title of Report	*Survey Sample*	*Main Survey Findings*
Real Estate in the Corporation: The Bottom Line from Senior Management (Arthur Andersen, 1993)	726 US and Canadian companies, 6.2% response rate; plus 50 interviews. Multi-sector survey.	Clear differences in the way senior management and corporate real estate (CRE) executives regard the CRE function.
Strategic Management of the Fifth Resource: Corporate Real Estate. Report of Phase One CRE 2000 – Executive Summary (Joroff, M. et al., The Industrial Development Research Council / IDRF, 1993)	The CRE 2000 research project was partly funded by The Industrial Development Research Council (IDRC) and industrial sponsorships for major Fortune 500 corporations in North America. Input into the project was provided by a broad-based group known as the CRE 2000 Commission whose membership is select, yet diverse, and represents major corporate real estate leaders as well as service providers and public sector leaders.	This first CRE 2000 report examines the emerging role of the real estate resource in large corporations by: - interpreting the impact of corporate change on the requirements for real estate strategies; - identifying innovative strategies that corporate real estate leaders are using to organize in order to align the real estate resources to fulfill corporate objectives. The report produced a five-stage corporate real estate developmental descriptive model.
Corporate Real Estate 2000. Phase Two CRE 2000 Reports: 1. Reinventing the Workplace (Joroff & Becker) 2. Toolkit: Reinventing the Workplace (Joroff et al.) 3. Generating High Performance - Corporate Real Estate Service (Lambert et al.) 4. Decision Support (Cameron & Duckworth) 5. Managing the Reinvented Workplace (Sims & Joroff, The Industrial Development Research Council / IDRF)	As above	Phase Two of the CRE 2000 Research produced five separate reports, which focus on disseminating 'best practice' tools. The findings are based on a series of case studies and workshops about state-of-the-art developments in the areas of corporate real estate management.

APPENDIX C: Summarized Information Sheets for the Case Studies

CASE 1: Dedham Executive Center, MA (Gause, 1998; Pg 44-45)

Building: A former landmark office building on the Washington Street in Dedham, Massachusetts

Owner: G.E. Real Estate, in 1989

Problem: Replacing tenants lost through normal attrition

Reason: A complete overhaul was needed to reposition it in greater Boston's highly competitive, increasingly sophisticated marketplace.

Purpose: To reposition the building in greater Boston's highly competitive, increasingly sophisticated marketplace.

Solution: The renovation involved upgrading and refinishing all public spaces. A cafeteria between two lobbies was relocated to a more suitable space, and the lobbies were reconnected with a public passage. New air-conditioned elevator lobbies in the parking garage solved an HVAC problem caused by unconditioned garage air coming in through elevator cabs. The new arrival sequence, lobbies, and internal circulation spaces, as well as a refurbished tenant amenities package, breathed new life into this tired building.

Assessment: According to John Cullnane, the property's building manager, the results were as follows:

"Dedham Executive Center has achieved significant retention rates with existing tenants, while new leases have brought its 180,000 square feet of space to 95 percent occupancy and rising."

CASE 2: San Felipe Court, Houston (Tierra Grande, 1993; Publication 1013)

Building: The property located in the Galleria-River Oaks area is a 242,909-square-foot, 325-unit apartment complex. In addition, a 54,975-square-foot office-retail development is on the site, 1954.

Owner: N/A

Problem: Substantial repair needed

Reason: Constructed in 1954

Purpose: The essential questions to be answered by the analysis are, first, whether or not the renovation will increase the property's value by more than the renovation's cost and, second, whether or not the expected return on the incremental investment is sufficient.

Solution: Renovation, which would lead from "Based on the actual rent collection and assuming 95 percent of the total space was occupied, the average monthly rental rate for the unrenovated apartments was 47.2 cents per square foot. The average monthly rental rate for the unrenovated office-retail space was 50.1 cents per square foot. Capitalizing the annualized net operating income at 10 percent yields an estimated April 1990 market value of $7,073,040", to "A 68.6 cents estimated average monthly rental rate was applied to the renovated office-retail space. These rental rates seemed achievable given the market study findings (see original case for details). A 5 percent vacancy rate was assumed. Capitalizing the annualized net operating income at 10 percent yielded an estimated value of slightly more than $10 million – a value increase of about $3 million between April 1990 and December 1993. Thus, a $2 million renovation was expected to increase value by $3 million."

Assessment: The renovations began in April 1990 and were largely completed by September 1991, somewhat ahead of schedule. Renovation costs totaled $1,821,463. The property's estimated value declined when the renovation began as those units vacated for renovation did not generate rent. As the renovation proceeded, however, rental collections and the property's estimated

value began to increase. The goal of a $3 million value increase was reached in December 1992 – one year earlier than planned.

CASE 3: Tower City Center, Cleveland (Gause, 1998; Pg 47)

Building: Tower City Center, a 17-acre mixed-use complex in Cleveland, late 1920s

Owner: N/A

Problem: During its heyday, the Terminal Tower complex was a regional and local passenger transportation hub and it offered direct pedestrian connections to adjacent department stores, hotels and office buildings. By the early 1980s, the office and shopping complex was still intact but shabby, a symbol of the general decline of downtown Cleveland (see the original case for details).

Reason: General decline of downtown Cleveland

Purpose: Developed to revitalize the downtown waterfront and bring viable business and retail back to a deteriorating CBD. The development vision was that the provision of high-quality mass transportation and retail amenities would encourage individuals and businesses to come back to downtown Cleveland.

Solution: Redevelopment - easy accessibility and synergistic mix of uses

Assessment: The redeveloped Tower City Center's easy accessibility and synergistic mix of uses have succeeded in bringing office tenants back to downtown. The project has catalyzed the revitalization of the CBD. State and local rehabilitation tax credits and local real estate tax abatements were also important to the project's financial viability.

CASE 4: Pacific Corporate Towers, CA (Gause, 1998; Pg 57)

Building: The 1.6 million-square-foot, three-building office complex

Owner: Pacific Corporate Towers, opened in 1984

Problem: The market dynamics of southern California meant that much more than just a fresh coat of paint, new lobby furniture, and a different parking entrance sign was needed. The redevelopment needed to appeal to companies moving to the coast from downtown and other Westside sub-markets and also to take advantage of expected improvement in the southern California economy.

Reason*: The window of opportunity for redesign opened in fall 1994, when the project's largest tenant announced that it was leaving due to overall defense industry downsizing.

Purpose: In the early stages of drafting a new plan, they recognized that dependence on traditional aerospace and defense tenants was not a viable option and that the project had to appeal to a new tenant population if it was to remain successful.

Solution: Renovation

Assessment: Leasing success has paralleled the project's redesign. The ten-month renovation was completed in time to take advantage of improvement in the local business climate, and a host of new companies has joined the growing tenant base. As final touches to the project were being completed, leasing agents concluded transactions totaling more than 465,000 square feet of space, valued at more than $50 million.

CASE 5: IT Center - Silicon Alley, NY (Gause, 1998; Pg 59)

Building: Manhattan's "hottest-wired" office tower, the New York Information Technology Center (IT Center) at 55 Broad Street. The outdated, 28-year-old, 400,000-square-foot, 31-story office tower

Owner: The New York Information Technology Center (IT Center)

Problem: In October 1995, there were more than 20 million square feet of vacant office space to fill in lower Manhattan

Reason*: Confident that lower Manhattan will emerge as a center for multimedia, Rudin targeted the information and telecommunications market for its renovated building. So many companies have already expressed an interest that Rudin is planning to double the center's space.

Purpose: In October 1995, with more than 20 million square feet of vacant office space to fill in lower Manhattan, New York State Governor George Pataki signed a bill designed to jump-start economic development in the once thriving financial and insurance district. The incentive package offers new commercial tenants a 50 percent real estate tax abatement for the first three years of occupancy and a 30 percent reduction in electricity costs from Consolidated Edison over two years.

Solution: Renovated at a cost of $15 million by Rudin Management Company

Assessment: The IT Center offers flexible space-configuration options such as pre-built floors for small tenants, serviced business suites, a small-business center, and unfinished tenant floors, all with full expansion capabilities (see the original document for details).

CASE 6: Blue Hen Corporate Center, Delaware (Gause, 1998; Pg 62)

Building: The Blue Hen retail mall, now the Blue Hen corporate center

Owner: Blue Realty Corporation, owner/developer of Blue Hen Mall

Problem: Too much retail space and an insufficiency of Class A office space.

Reason: A regional mall built in the 1980s approximately three miles north of Blue Hen had drawn most of the Dover's primary retail trade, including Blue Hen's two major anchor tenants.

Purpose: Meanwhile, AEtna Health Plans began looking in 1994 for office space in the Dover area. To meet its rapidly growing operations, Aetna needed to occupy new space within six months.

Solution: The conversion of the Blue Hen retail mall to the Blue Hen corporate center: a nontraditional solution to AEtna's space needs, convert one of two structurally sound but vacant anchor department stores at the underutilized mall.

Assessment: AEtna's evaluation of the proposal determined that the conversion would provide excellent space at a better price-to-value ratio than built-to-suit space and other alternatives. Consequently, AEtna leased 68,000 square feet of a 90,000-square-foot, one-story building, with an exclusive option to lease, the remaining space for expansion.

This solution met AEtna's goals. The building's renovation took only four months and it cost substantially less than space in a new office building. AEtna obtained significantly better office space than other options would have provided at a lower rental rate – and, as a bonus, built-in expansion space. AEtna's move attracted other office tenants to the mall, now known as Blue Hen Corporate Center. On the retail side, service retailers like fast food outlets and card shops have evinced much more interest in a Blue Hen location since the influx of approximately 1,500 new office employees.

CASE 7: Thomson Financial Services HQ, Boston (Gause, 1998; Pg 126)

Building: A group of seven brick and timber warehouse buildings in Boston's Fort Point Channel.

Owner: Thomson Financial Services, an international high-tech software/publishing company

Problem: To consolidate several regional offices into a new corporate headquarters that would make a statement.

Reason: The task facing Thomson and the project's designer, ADD Inc., was to create a unified corporate identity in 225,000 square feet of space on 27 floors of seven buildings with dramatically different floor and ceiling heights.

Purpose: To consolidate several regional offices into a new corporate headquarters that would make a statement

Solution: The design team began the process by generating a list of building attributes and concerns. The designer's response to such concerns evolved into a design menu of architectural components and accent color palettes that was divided into two categories: foreground and background. These architectural elements link the seven warehouse buildings that have been connected but still maintain their individual entrances and street addresses. The buildings thus serve as neutral enclosures that house distinct working "neighborhoods."

Assessment: This use of pavilions and storage units allows Thomson to grow and change just as an established city grows over time, by connecting landmarks and plazas. And, like the urban landscape it occupies, this workplace can evolve as new people and technologies join Thomson's corporate culture.

CASE 8: National Bank Plaza, Phoenix (Gause, 1998; Pg 170)

Building: The National Bank Plaza in downtown Phoenix

Owner: Grossman Company Properties and Aetna Life Insurance Companies

Problem: Out-dated

Reason: Constructed in 1980

Purpose: Make the 16-story, 265,000-square-foot building a Class A property that could attract and maintain a tenant base of small professional firms.

Solution: $3 million renovation: The project involved upgrading the appearance of the 1980 building and updating its energy systems to make them more efficient and cost-effective.

Among the major improvements were the installation of an energy management system, a lighting retrofit, an HVAC retrofit, and the replacement of the cooling towers. A computerized energy management system (EMS) – the CSI S7000 series – was installed. This allows the engineering staff to closely monitor and control all HVAC and lighting functions, detect malfunctions, and produce monthly energy use reports.

Assessment: As the renovation progressed, the building's occupancy rose from 40 percent to 95 percent.

CASE 9: Commonwealth Tower, Virginia (Gause, 1998; Pg 175)

Building: Commonwealth Tower in Arlington, Virginia

Owner: Developer London & Leeds

Problem: Dated and dark 12-story office building

Reason: The 1971 building was vacant when it was taken over by developer London & Leeds in 1987 for the purpose of renovating it inside and out.

Purpose: Transforming the building into a bright and modern 15-story tower.

Solution: A $24.7 million renovation: The renovated building features light-gray and white precast concrete panels, extensive glazed areas, and a new two-story lobby that reorients the building to a different street. Three new floors provide an additional, 66,000 square feet of space.

The 1971 building was vacant when it was taken over by developer London & Leeds in 1987 for the purpose of renovating it inside and out. The developer gutted the building and removed asbestos, leaving only the basic building structure.

One of the developer's primary goals was to increase the leasable space on the site. Several options were explored, including complete demolishment. Analyses by Skidmore, Owings & Merrill (SOM), the project architect, of the structure's joints and foundations and the bearing capacity of the soil verified that the structure could accommodate three additional floors.

After the determination that the building could be enlarged, the next step was to design an exterior that would create a new image for the building. The developer wanted to create a lighter, brighter, and more inviting building that would bear no resemblance to the older one.

Assessment: The project was completed on time and within budget. A large part of the project's success can be attributed to the developer's having had a clearly stated goal. This focus helped to eliminate wasted efforts by the designers and kept the project moving (see the original document for details).

CASE 10: Pacific Gas & Electric Company HQ, San Francisco (Gause, 1998; Pg 180)

Building: Pacific Gas & Electric Company (PG&E) headquarters in downtown San Francisco

Owner: N/A

Problem: The complex had been damaged in the October 1989 Loma Prieta earthquake.

Reason*: PG&E's board of directors had considered several options for the buildings – including sale, demolition, and expansion. It determined that renovation would result in the least cost to customers and the greatest benefit to shareholders and the city of San Francisco.

Purpose: The project was undertaken to strengthen, restore, and connect the four landmark buildings that housed PG&E's headquarters offices as well as power and telecommunications equipment.

Solution: A three-year seismic retrofit: The four 50-foot-wide buildings totaling 533,985 square feet wrap around three sides of a block to create a broad courtyard. They had four separate addresses. The renovation structurally united the two oldest buildings and added connections to consolidate the four buildings into one address – 245 Market. The original facades and many historical details were restored.

A shear-wall system replaced the complex's seismic resisting system. A special concrete shear wall forms a U around the center courtyard. It is designed to distribute seismic forces efficiently from the two interconnected buildings to their foundation.

At the same time, the office interiors were modernized to be more functional and flexible. State-of-the-art, energy-efficient lighting and HVAC systems were installed. Approximately 17,000 square feet on the ground floor was converted to retail space. Lease income will help offset the building's operating costs, and retailing will create more activity on the block. The total cost of the seismic retrofitting of the complex was an estimated $178 million, an amount that was expected to be reduced by at least $20 million through a federal historic building rehabilitation tax credit.

Assessment: One of the most comprehensive seismic retrofits of a historic complex in the United States.

CASE 11: Harborside Financial Center, New Jersey (Gause, 1998; Pg 181)

Building: 1.9 million-square-foot Harborside Financial Center, a freight-handling terminal in 1929

Owner: N/A (developer Jones Lang Wootton)

Problem: Obsolescence

Reason*: The building's accessibility to Manhattan orients it to the downtown New York market more than to the suburban New Jersey market.

Purpose: The original warehouse had structural advantages that, in the view of Harborside's developer Jones Lang Wootton, made its conversion use as high-tech, back-office space a natural choice (see the original document for details).

Solution: Adaptive re-use: The 1.9 million-square-foot building now offers high-tech office space for the back-office operations of financial services, insurance, and shipping companies. Given Harborside's functional strengths and market orientation, the developer targeted its marketing at financial services and shipping companies located in Lower Manhattan. In its proactive campaign to lure tenants out of Manhattan, the developer emphasized the building's lower occupancy costs and its functionally superior space for back-office and data operations.

Assessment: An important feature of the marketing strategy is a package of tax breaks and other economic incentives available to businesses locating in this part of Jersey City. Among these are discounted electricity prices, no corporate income and occupancy taxes, and a 15-year abatement of real estate taxes. In addition, the area's designation as a state urban enterprise zone means that businesses at Harborside are exempt from sales tax on the purchase of business equipment and services.

CASE 12: Preservation Park, CA (Gause, 1998; Pg 194)

Building: Sixteen 19th-century Victorian residences, 11 of which were relocated to the site, make up the 55,604-square-foot Preservation Park business neighborhood on two blocks adjacent to the Oakland City Center mixed-use redevelopment project in downtown Oakland, California.

Owner: Bramalea Inc., the Toronto-based developer

Problem: Obsolescence

Reason*: The developer targeted nonprofit organizations in the belief that they would be willing to occupy unconventional office space within a neighborhood undergoing gentrification. Moreover, the office needs of the growing public service sector were not well served at the time, reinforcing the choice of nonprofit organizations as the target market.

Purpose: The historic residences were renovated for use as office and meeting space.

Solution: The renovation and refurbishment of 11 historic structures and limited on-site improvements

Assessment: Work was completed by 1991, and 18 months later the project was fully leased. To develop its marketing strategy, Bramalea first undertook a market survey of nonprofit organizations, pinpointing their space needs and rent levels. The survey, along with a direct-mail campaign, was the principal method of introducing the project to the nonprofit community in the early phases. Rent-up was successfully achieved over a planned 18-month period, which was long enough to allow Bramalea to be selective in the tenants it accepted. The project's cash flow after debt service provides sufficient income to offset ongoing property management and capital improvement costs.

To provide business services for the nonprofit tenants, some space at Preservation Park is reserved for commercial tenants, which currently include a café and a printing / copying shop. A two-tier lease rate system differentiates between the two types of tenants, with lower rates offered to nonprofit tenants and higher rates to commercial tenants.

Preservation Park's conference and banquet facilities generate a valuable revenue stream while they also give the project good market exposure.

CASE 13: Building 661 – Langley Air Force Base, Virginia (Allan, 2000; Pg 32-34)

Building: Building 661 was constructed as a machine shop, used for a time as a garage, converted to a Post Exchange and commissary, then used as a publications warehouse, mail distribution center, and cafeteria.

Owner: N/A

Problem: Obsolescence

Reason*: N/A

Purpose: To provide administrative space for additional personnel resulting from the merger of the Tactical Air Command with the Strategic Air Command and the creation of Air Combat Command at Langley AFB.

Solution: Adaptive-use: The project scope included development of a design for adaptive re-use of the building, removal of the non-contributing and architecturally incompatible rear addition, and restoration of key architectural elements, including steel-framed windows and skylights. It also addressed repair of failing structural and masonry systems and complete replacement of roofing, electrical, mechanical, and plumbing infrastructure.

From the start, design was based upon two basic tenets: creation of efficient and functional building spaces to meet the needs of contemporary office users, and respect for and restoration of the significant historic qualities of the structure.

Assessment: Renovation began in January 1998 and the estimated completion date is June 2000. Project managers are confident that the goal of providing efficient building space will be met. As for restoration of the structure's significant historic features, the final consensus may be that the project was more a renovation than a restoration in the truest sense of the word. Throughout the demolition and construction process, numerous serious unforeseen conditions were discovered. Structural failure in many cases was severe and exacerbated by demolition of building components. As a result of budget constraints, money originally earmarked for restoration of exterior elements, lighting, parking, and landscaping had to be diverted to correct structural problems (for lessons learned see the original document).

CASE 14: Court House Square, Columbus, Ohio (ULI, 1978; Pg 64)

Building: Court House Square, Columbus, Ohio, mid-1974

Owner: City of Columbus

Problem: Functional obsolescence

Reason: Much existing commercial development in central city locations takes the form of one- and two-story buildings strung out along major arterials. Appropriate to the streetcar era, this form of development is now functionally obsolete.

Purpose: To restore the commercial vitality by converting a deteriorated two-square-block area into a modern office complex.

Solution: Adaptive reuse

Assessment: The site had important locational advantages despite its generally rundown condition. These included ready access to both the inner belt expressway and German Village. The key consideration in the decision to convert the property to office use, however, was the construction of a new county courts complex one block to the north across the inner belt on South High Street. Development strategy presumed that the new office space would be attractive to legal firms and other professionals desiring locations close to the new complex.

Most of the original buildings were structurally sound, even though they had suffered from neglect and inadequate maintenance over many years and exhibited varying degrees of deterioration. The decision as to which of the structures to retain and which to remove was based primarily on the amount of building necessary to satisfy the parking requirement and on each building's reuse potential within the framework of the redevelopment plan. Although the structures were old, those to be retained were structurally sound and required no major reconstruction. Renovation consisted primarily of modernizing interior spaces by adding stairways, elevators, toilet rooms, and completed mechanical and electrical systems. The new structures were proportioned and detailed to blend in with the older buildings.

CASE 15: The Dewitt Building, Ithaca, New York (ULI, 1978; Pg 96)

Building: The Dewitt Building, Ithaca, New York, 1972

Owner: A local architect/developer

Problem: As educational needs and standards have changed over the years, many school systems have chosen to build new facilities rather than invest large amounts of money in the modernization of old schools.

Reason: An obsolete school building often occupies a large site in a central location, and, as a public building, pays no taxes to the city. These factors have proved fatal to a great number of early 20th century schools. Instead, the Dewitt School, built in 1915 and declared surplus public property in 1970, provides an excellent example of the popular and economic success that can accompany the adaptive use of an old structure.

Purpose: The Dewitt occupies a half-block site and is one of the largest buildings in downtown Ithaca, a city of 26,000 at the time. Despite a general atmosphere of pessimism in the early 1070s concerning the future of the downtown, the developer felt that the location and character of the building would have an appeal for residents, commercial tenants, and shoppers.

Solution: Conversion to multiple use, including apartments (adapted from the original classrooms), offices, and shops opening onto an interior mall.

Assessment: The immediate success of the project, which opened in 1972, helped to reestablish confidence in the downtown area and most likely helped spur a major community renewal program which featured construction of a pedestrian mall on part of the city's main commercial street, one block form the old school.

The location of the school building in the downtown area, with immediate access to both shopping and residential neighborhoods, was one key to the project's success. Having mixed uses undoubtedly contributes to the project's vitality by tapping several markets at one time. The low acquisition cost of the building was a vital factor in the financial viability of the project. The developer emphasized the necessity for adaptive use projects to be taxed according to their earning ability rather than their replacement value. Without

this pragmatic approach to assessment, annual property taxes could prove to be an impossible financial burden.

CASE 16: Long Wharf, Boston (ULI, 1978; Pg 104)

Building: The Custom House Block and the Gardner Building, Boston, 1715

Owner: Trustees of the Custom House Block Trust

Problem: In 1869 the Wharf (on Boston's historic waterfront) was shortened considerably by the construction of Atlantic Avenue, cutting the wharf nearly in half. In the early 20th century, the inner harbor of Boston became less important because of its shallow depth, and the waterfront buildings fell into disrepair. Large portions of both the Gardner Building and the Custom House remained unoccupied or were used for dead storage and some light industry such as soap manufacturing, pipe cutting, and metal fabrication.

Reason: Older buildings, especially those which have been used for warehousing or manufacturing, typically have hidden assets, which, when tapped, make reuse of the buildings attractive to developers. These assets can have to do with a structure's height, space, or volume or with such intangibles as its character and personality, all of which can add to the value of the property. For example, if a developer buys a building with a special configuration and square footage and can "find" additional, usable space within it, then s/he has tapped the hidden assets of the structure.

Purpose: N/A

Solution: Adaptive reuse of the Custom House Block to luxury rental apartments, retail and office space, and renovation of the Gardner Building to accommodate restaurant chain.

Assessment: Designation of Long Wharf as a redevelopment area had the effect of locking the developer into a reuse scheme if he wished to retain the property in private ownership. Local officials at the redevelopment authority supported the project since it was consistent with their urban renewal plan to create mixed-use projects on the waterfront. Warehouse and factories are generally attractive buildings for reuse. Structurally, they are over-designed which, in the case of the Long Wharf buildings, often allows the developer a great deal of flexibility in accommodating all the proposed uses. It was felt initially that

adaptive reuse projects would be marketable and profitable during period when money was tight because of the monetary deterrents to new construction. However, they prove to be profitable no matter what.

CASE 17: BP Exploration, Aberdeen, Scotland (McGregor, 1999; Pg 93)

Building: BP Exploration, based in Aberdeen

Owner: BP Exploration

Problem: A void in their workspace where previously 250 staff had worked.

Reason: They contracted-out their finance function, which at that time employed around 250 people, to accountants Arthur Andersen. Not only did this have profound effects on the day-to-day operations of BP Exploration, and of course of the people concerned, but it had major implications for the BP facilities managers who almost overnight, had a void in their workspace where previously 250 staff had worked.

Purpose: To fill the void in the workspace.

Solution: For many organizations this would have created many difficulties, even if the 'extra' space would have helped ease congested workplace layouts – too much space, consuming resources and incurring costs. Fortunately for BP Exploration, they were simultaneously attempting to rationalize their accommodation following their earlier acquisition of Britoil, who had been occupying some 20,000 sq.m. of accommodation elsewhere in Aberdeen. Therefore, by re-organizing their department's locations, they were able to provide Arthur Andersen with a ready-made office in part of the former Britoil premises, which BP were eventually able to vacate.

Assessment: Succeeded in filling the space and prevented the company from consuming resources and incurring costs due to the extra, unoccupied space.

CASE 18: Old Mill Plaza, Newton, Kansas (ULI, 1978; Pg 116)

Building: Old Mill Plaza, Newton, Kansas, 1886

Owner: Newton resident Lloyd Smith

Problem: When demolition seemed imminent despite community protest, Newton resident Lloyd Smith stepped in to purchase the mill and inaugurate a second term of useful existence for the complex.

Reason: As the only remaining 19th century mill complex in Newton, the building symbolizes the town's part in the birth and growth of the wheat industry in the Midwest.

Purpose: In any location, the economics of an adaptive reuse project depend to a great extent on an accurate evaluation of the costs and market potential of the building involved. But other factors might also be at work in determining the ultimate success of an adaptive use development in a small town. An older building can have particular visual and historical significance, and a community may take special interest in the preservation of these physical resources. By recycling a building, a developer may also have an opportunity to develop a space which cannot be duplicated elsewhere and will attract attention because of its unique character.

Solution: Adaptive reuse: to return the landmark to an economically useful life. Located on Main Street and the southern end of Newton's commercial and business district, the developer saw a greater market potential for the adaptation of the mill for rental offices and for his own corporate headquarters and light manufacturing operations.

Assessment: The character of the old mill complex is considered a substantial asset by the tenants, who are willing to pay high rents for their unique spaces. Not only do the tenants appreciate the buildings and their individual offices, but they are confident that the complex elicits a favorable reaction from clients as well. For the developer, this represents a conversion of the intangible qualities of the old building into tangible economic gain. Because the developer sought a Small Business Administration loan based on improving facilities for its own company, he did not encounter the typical stumbling block of many adaptive

reuse projects: the necessity of lining up prospective tenants before rehabilitation begins in order to secure financing.

CASE 19: Lake Union Steam Plant, Seattle, Washington (Gause, 1996; Pg 84)

Building: Lake Union Steam Plant, Seattle, Washington, 1911 - 1922

Owner: Koll Company, 1994

Problem: When the old steam plant was decommissioned in 1984, the city and many in the community hoped to find a new use or a buyer for the property, but the building was to remain vacant and unmaintained for nearly a decade.

Reason: Extending over the eastern shore of Lake Union, about one mile from downtown Seattle, the steam plant provided power to the city for more than 70 years. The massive trapezoidal structure, with its seven towering smokestacks and large window bays, has been a prominent landmark on the Seattle waterfront for generations. In 1989, shortly after the steam plant's designation as a historic landmark, Koll Real Estate Group offered another parcel of land to the city in exchange for the steam the city in exchange for the steam plant. To make future redevelopment of the steam plant more feasible, the city assumed responsibility for environmental remediation. While negotiating with Koll for the property, the city offered the developer a $1 million discount (its estimate of cost of cleanup) to take the property in its present condition, assuming that Koll could do cleanup for less by avoiding the public bidding process required for city contracts.

Purpose: In June 1994, the Koll Company completed 14 months of extensive renovations to transform the Seattle Steam Plant into a headquarters and laboratory for ZymoGenetics.

Solution: Adaptive reuse.

Assessment: The project used a negotiated construction contract and design-build subcontractors for mechanical, electrical, and plumbing work.

CASE 20: The Carriage Works, Atlanta, Georgia (Gause, 1996; Pg 115)

Building: The Carriage Works, Atlanta, Georgia, 1907

Owner: Carriage House Associates, a joint venture of Carriage Works Partners and Marietta Atelier, Inc. (Winter Group of Companies), 1988

Problem: Built in 1907 and located on Means Street near downtown Atlanta, the building's most recent use was a warehouse. In 1988, after standing vacant for ten years, the building was purchased by Carriage House Associates.

Reason: Winter Properties chose to redevelop the Carriage Works building largely because of its historic value and downtown location.

Purpose: The revitalization of a neglected area near downtown Atlanta into a new art district. The project is within minutes of the CBD, midtown, and Georgia Tech University.

Solution: Winter Properties sensed a demand for distinctive, economically priced office space that would appeal to Atlanta's growing creative, high-tech community. The company felt it could attract this niche market by creating appealing office space in a historic building.

Assessment: The redevelopment of the Carriage Works has generated demand among artists for the loft housing, prompting the conversion of many surrounding structures into loft housing developments. As artists, arts organizations, and emerging high-tech businesses continue to be attracted to this formerly rundown area, wider revitalization is assured.

CASE 21: 3800 Tower at Phoenix City Square, Phoenix, Arizona (Kiell, 1992; Pg 63)

Building: 3800 Tower at Phoenix City Square, Phoenix, Arizona, 1963

Owner: New York-based Merrill Lynch, Hubbard, Inc., 1985

Problem: Phoenix by the early '80s had transformed as a business center and city. Most Class A office development had shifted several miles south. The Rosenzweig Center, its style, and its location had not aged gracefully. The competitive edge and some of the premier tenants were lost to newer properties. A tired, faltering building was dealt an even harsher blow when the Del Webb Company went bankrupt. Abruptly, the majority of the space in the building was vacant and the occupancy rate was on its way down to 16 percent. During a short period, the property changed hands twice, which further exacerbated problems by alienating present tenants, prospective tenants, and the brokerage community. And at the time of acquisition, the entire Phoenix market was entering a woefully overbuilt condition, with citywide Class A vacancy rates that would reach as high as 40 percent.

Reason: The 16-story, 215,000-square-foot building was part of the city's original mixed-use urban center – the focus of Phoenix's primary office market when constructed and through the 1970s. As such, it had represented a significant landmark, attracting the headquarters of several Fortune 500 companies. At the time the acquisition was made the building was an underutilized asset not achieving its potential as a commercial investment.

Purpose: In the owner's opinion, the 3800 Tower was capable of substantial appreciation through wisely invested improvements. The goal was to turn a Class C building into a Class A building. In other words, 3800 Tower was a perfect example of an extremely undervalued property. Thus, the goal in renovating this building was to upgrade its image economically and return it to a competitive and marketable Class A office environment.

Solution: Renovation: Numerous design solutions were implemented to update and improve the image of the 3800 Tower and the buildings and property surrounding it.

Assessment: By the end of 1989, a year after the renovation was completed in December 1988, occupancy reached the 70 percent level, which was achieved in an extremely overbuilt office real estate market.

CASE 22: Lloyd's Building, London (McGregor, 1999; Pg 110)

Building: Lloyd's building, London

Owner: Lloyd's, the operator of the insurance market in London

Problem: Almost 2,000 sqm of surplus workspace in their head office

Purpose: The elimination of a non-performing asset from their estate

Solution: In June 1998, by which time Lloyd's had consolidated the surplus workspace into one homogenous area, Regus commenced a 10-year lease of the workspace, during which time they will market and operate the space as a 'business center'. The fully serviced workspace is available for hire by third party businesses for short-term periods ranging from a few days to a few years, as their needs demand. Regus manages the serviced space providing a full range of facilities for their tenants, some of which are provided by Lloyd's in-house facilities team and which are charged to Regus on full commercial terms.

Assessment: The benefits of this arrangement are manifold. For Lloyd's, apart from the elimination of a non-performing asset from their estate, as Nick Phillips of Lloyd's puts it, "Regus provide a well known branded product to which buyers of serviced workspace are accustomed. This it is hoped, will result in occupiers being attracted to the premises who may eventually seek long-term accommodation which Lloyd's is well placed to provide from their principal facilities." For Regus, they have a high quality building with a sophisticated infrastructure in a prime location, in which to develop their flexible workspace offering for the business market. For tenants, they are able to operate from first class accommodation in the heart of the business district of London, equipped and serviced to a high standard, and all on flexible 'pay as you go' terms. Of course such arrangements are not without risks. To minimize the more obvious ones, access to the serviced suite is via an entrance that is separate from that to Lloyd's own space, and tenants are not permitted to refer to Lloyd's in their address.

CASE 23: Odetics Building, Anaheim, California (Kiell, 1992; Pg 71)

Building: Odetics Building, Anaheim, California, Age: 24 years

Owner: Odetics, Inc.

Problem: The facility was to unite under one roof all six of the company's existing divisions (all of which were, at the time, geographically seperated). Yet it was to provide each division with its own autonomy.

Reason: The redesigned complex was to reflect the "high-tech" image of the company's products and provide on-site amenities that would combine work and play, such as a swimming pool, which has gained the company a seat among "the top 100 companies to work for in America."

Purpose: The objective was to convert the existing, vacant, 254,000-square-foot three building industrial/manufacturing complex located in Orange County, California, to a corporate headquarters, research, development and manufacturing facility for ODETICS.

Solution: Adaptive reuse: The existing structure was found to be structurally sound, which meant that by leaving intact the basic structure of the building the greater portion of the budget could be spent on image and alteration of function.

Assessment: A hodge-podge of industrial buildings is integrated into a cohesive, stylish corporate headquarters and R&D facility.

CASE 24: Powerlink Queensland, Brisbane, Australia (McGregor, 1999; Pg 129)

Building: Powerlink Queensland, Brisbane, Australia

Owner: N/A

Problem: The site chosen for the new headquarters was a recycled 40-year-old former industrial building located on a railway yard, which was converted into a modern office building with a central atrium that incorporated water features and piped-in music, and set in a landscaped park.

Reason: N/A

Purpose: The drive of the new Board of Management was to change a former public sector commission responsible for the generation and transmission of power with overtly bureaucratic trappings and over 3000 staff, into a modern streamlined commercially focused business comprising 500 employees.

Solution: Refurbishment and relocation of headquarters to a consolidated site

Assessment: Senior management saw the new workspace as a catalyst for change, in their desire to promote teamwork and the allocation of space based on function and needs, rather than status and wants.

CASE 25: Manufacturing company, Fife, Scotland (McGregor, 1999; Pg 145)

Building: Manufacturing company, Fife, Scotland

Problem: Ten years after opening premises that were both their factory, administration and sales office, this manufacturer had redeveloped the workspace wholly as offices. The adaptation of the factory was carried out in a piecemeal manner as parcels of workspace were released, resulting in a disjointed group of spaces that bore little, if any, relation to the needs of the people who were accommodated within them or their work processes. And so it would most probably have remained had it not been for a major fire that completely gutted the premises.

Reason: When the premises were first occupied, approximately 95% of the workspace was factory, accommodating machine shops, assembly lines and materials stores, with the remaining 5% allocated to enclosed offices. As the business expanded, creating demands for increased production, new state-of-the-art machinery was acquired which brought with it demands for more space and more sophisticated services, both of which could only be addressed by new premises. As a new factory was brought into operation the original premises were released and progressively adapted for use as office space to accommodate the burgeoning telesales operations, which were driving business growth to an annual turnover of £40 million, as well as larger administrative support teams.

Purpose: To create a functional and supportive environment.

Solution: But rather than immediately embark upon rebuilding what had previously existed, the chief executive realized that the fire, although highly disruptive for the business, presented an opportunity to address many of the failings previously identified in the workspace but which had, until then, not been considered practical to address. These included: reorientation of key functions in the building by repositioning the entrance and access to the building, creating a large open work area at the center of the building and a range of large and small enclosed spaces, as well as increasing the overall amount of workspace by extending the building, and improving the services infrastructure.

Assessment: New premises were available for use 23 weeks after the fire, with staff working in a functional and supportive environment, which only a short time before had seemed a distant prospect. A clear case of turning adversity to advantage.

CASE 26: The Boott Mills, Lowell, Massachusetts (Kiell, 1992; Pg 125)

Building: The Boott Mills, Lowell, Massachusetts, 1835-1890

Owner: Congress Group Properties

Problem: Until World War II, Lowell remained a significant and strong factory town. But then its fortunes turned. At the Boott Mills, textile manufacturing stopped in 1956. The mill operation was closed and the buildings were leased as warehouse and light manufacturing space. The city of Lowell went into a long tailspin, which was not counteracted until the implementation of a massive urban revitalization program known as "Lowell Plan". The Boott Cotton Mills were not designed as modern, upscale office and R&D space in the late 20th century; they were constructed to accommodate the production and storage of 19th century textile goods. So the design challenge was to make a dramatic transformation in the use and functioning capacity of these buildings while preserving the character of the original structures.

Reason: The portion of Lowell between the Merrimack River and the Eastern Canal is now a designated Historic District and part of the Lowell National Historic Park. Over the course of more than a century, this was the site of a thriving textile manufacturing center.

Purpose: To convert the nine-building mill complex into a first-class office space.

Solution: Adaptive reuse

Assessment: The Boott Mills project involves transforming nine industrial buildings into 608,000 square feet of office, retail, and R&D space, plus 112,000 square feet of storage area for records and bulk storage.

CASE 27: Hamilton Watch Complex, PA (Facilities Services Newsletter, 2003)

Building: The Hamilton Watch Complex, PA: listed on the National Register of Historic Places, has long been one of Lancaster's most visible landmarks.

Owner: Eastern Alliance Insurance Company (EAIC) urgently needed new space to accommodate their rapid growth.

Problem: The challenge was transforming this 90,000-square-foot unused industrial building into a new commercial/office complex that would harmonize with the other sections of this 11-building, historic complex as well as meeting EAIC's needs.

Reason: N/A

Purpose: The main focus was to retain the historic character of the existing building constructed in 1941 and its 1963 addition while enhancing the condition of its art deco and international style features in conjunction with the adaptive-reuse.

Solution: Adaptive re-use

Assessment: The result of this collaborative eight-month design/build effort was EAIC moving into 26,000-square-foot of this renovated building in November 2002 and returning the building to the City of Lancaster's tax rolls.

CASE 28: Audubon House, New York (Gause, 1998; Pg 262)

Building: Audubon House, New York located at 700 Broadway in Lower Manhattan

Owner: The National Audubon Society, one of the nation's leading environmental groups

Problem: The former department store had been largely vacant for over ten years. By its reuse of an existing structure, the society hoped to realize direct economic, environmental, and social benefits.

Reason: N/A

Purpose: To renovate a century-old, eight-story building into one of the most energy-efficient, environmentally responsible office buildings ever designed. In undertaking this project, Audubon's goal was to demonstrate that environmentally responsible development could be achieved at market cost using readily accessible, off-the-shelf technology and materials.

Solution: Adaptive re-use: Audubon acquired the building, located at 700 Broadway in Lower Manhattan, in 1989 for $10 million.

Currently, the building's fourth through eighth floors provide office space for Audubon's 170 employees, the second and third floors are leased to other nonprofit organizations, and the ground level is leased for retail use. On the roof level are a newly built conference center and mechanical room. Audubon had been paying more than $1 million a year to lease 40,000 square feet in a conventional high-rise office building. Given market conditions in New York in 1987, as well as the nonprofit firm's ability to secure tax-exempt financing, Peter Berle, the society's president, was convinced that building ownership was a cost-effective alternative.

Assessment: All major design, engineering, and purchase decisions were tested against three criteria. Is it environmentally sound? Is it cost-effective? Can it be achieved through the use of off-the-shelf products that are readily available to everyone? The conventional development standard that says added costs should be paid back in two to three years was, Audubon perceived, shortsighted and inhibitive to environmentally responsible development. The

developer therefore adopted a cumulative five-year maximum payback standard.

The building's design and environmental performance focus on four key areas: energy conservation and efficiency; direct and indirect environmental impacts; resource conservation and recycling; and indoor-air quality.

Audubon House's healthy work environment – its superior ventilation, air quality, and lighting – was expected to save the National Audubon Society thousands of dollars as a result of increased employee satisfaction, attendance and productivity. Altogether, Audubon estimated that its decision to buy and renovate the 700 Broadway building would save the organization $1 million a year, compared with remaining at its old address.

In developing this building, the National Audubon Society proved what it set out to prove: that an office building can be a star performer in environmental terms and economically. It is possible for developers to consider environmentally responsible design parameters – including energy efficiency, the sustainable use of resources, and healthy indoor-air quality – on an equal footing with the traditional criteria of cost, schedule, functionality, and aesthetics. Development practices can respond to many environmental concerns and still produce cost-effective and highly functional buildings.

CASE 29: The Rookery, Chicago, Illinois (Gause, 1998; Pg 268)

Building: The 109-year-old Rookery Building, located in the heart of Chicago's

Owner: Baldwin Development Company

Problem: With painstaking exactitude, Baldwin Development Company and its restoration architect have brought back elements of the Rookery's three eras – Daniel Burnham and John Wellborn Root's original 1886 design, Frank Lloyd Wright's 1905 modernization of the interior, and a 1931 remodeling by William Drummond – while at the same time renovating the office floors to compete with the most expensive, recently constructed office space inside Chicago's Loop.

Reason: Though the Rookery was designated a National Historic Landmark in 1972, it stood blackened and crumbling from decades of neglect and artless makeshift alterations until the late 1980s. L. Thomas Baldwin III, a successful futures trader with no previous real estate experience, bought the building in 1988 and embarked on a three-and-a-half-year, $110 million labor-of-love restoration. Opening in 1992 in an oversupplied market, the Rookery nevertheless met with critical, leasing, and financial success.

When the 12-story Rookery opened in 1886, it was one of the tallest and most expensive office buildings of its day, and also one of the first built on speculation. The Central Safety Deposit Corporation, the original developer and owner of the building, held the land on a 99-year lease from the city of Chicago. Central Safety Deposit owned the property until it reverted to the city in the early 1980s.

When ownership of the Rookery reverted to the city of Chicago in the early 1980s, the city realized that extensive work was required to make the landmark building functional. It decided to sell the property while retaining easements to preserve the architectural integrity of the exterior and key interior spaces. In 1983, Continental Illinois Bank, whose headquarters located next door, bought the Rookery and announced a five-year restoration plan. The bank had completed a thorough cleaning of the outside of the building when financial misfortune forced it to halt the renovation and put the Rookery back on the market.

Purpose: Baldwin was determined to disprove the widely accepted notion that the cost of expensive, high-quality restoration cannot be recovered in rents.

Solution: Renovation: In December 1988, L. Thomas Baldwin bought the 293,962-square-foot Rookery from Continental for $28 million cash, formed Baldwin Development Company, and began to assemble a team to renovate the building. The project qualified for a 20 percent federal tax credit on the total construction cost, amounting to $14.5 million. No other incentives were available for preservation.

Baldwin's strategy was to restore the Rookery's historic architectural features and to incorporate up-to-the-moment heating, air-conditioning, electrical, elevator, security, and telecommunications systems into the upper office floors without losing the feeling of the old building. Essentially, floors three through 12 would be a gut rehab with the exception of the old Burnham and Root library on the 11th floor, which would be fully restored.

The development team did not attempt to restore the Rookery to its original design. Rather, the team restored elements from the building's major design and construction eras in some instances, reconstructed them in others, and added some new features. The focus of the restoration was to return the first two floors – the public spaces – to the Wright period.

Assessment: The Rookery opened in May 1992 with 48 percent of the space leased, at a time when commercial space in downtown Chicago was extremely oversupplied. Brooks Brothers opened a 12,174-square-foot store on the ground floor of the building before renovation is completed. As of early 1995, the office space was 86 percent leased and the retail space was 77 percent occupied. The Rookery's average asking lease rates of $26 per square foot for office space and $32 to $54 per square foot for retail space match those of the newest Class A space.

The success of the Rookery can be measured with several yardsticks. The restoration of this architectural treasure, for example, has received many honors and awards. More important than design awards, however, from a real estate perspective, is the building's success with tenants as demonstrated by the top rental rates it commands and its healthy occupancy level. Finally, in the words of Robert Fraley, chief financial officer for Baldwin Development Company, "the combination of some creative financing, rapid lease-up, and a

stroke of luck on interest rates has enabled the Rookery to meet its required debt service."

Experience Gained: This project sets the standard for future commercial renovations and proves that the cost of expensive, high-quality restoration can be recovered in Class A rents. The Rookery project underlines the importance of thorough research to properly determine the real scope of a historical building restoration project. Details are essential. And it is also important to be flexible and careful.

CASE 30: State Street Bank Building, Boston, MA (Gause, 1998; Pg 276)

Building: The State Street Bank Building at 225 Franklin Street in downtown Boston

Owner: Hexalon Real Estate

Problem: Today, many owners of high-rise office towers built in the 1960s and 1970s are faced with the decision of whether to invest in extensive renovations in an effort to compete with the newer generation of office buildings, or risk slipping into Class B status.

Reason: Built in 1964, the 34-story building was the first modern skyscraper constructed in Boston's financial district. As one of only two buildings in Boston's skyline with a lighted sign – a result of the city's prohibition of such signs in 1966 – State Street Bank has been a familiar landmark for generations.

Purpose: In 1985, with Boston's building boom in full swing, Hexalon bought the bank's option. Despite the building's healthy 95 percent occupancy, the new owner knew the status of the building was deteriorating along with its value. Inherent safety concerns as well as a state law requiring the installation of sprinkler systems in all Boston's commercial buildings by January 1, 1997, prompted Hexalon to address the presence of asbestos in the building. The loss of a 170,000-square-foot law firm and the occupancy of a major tenant at below-market rates further compromised the building's future economic viability. In addition, State Street Bank, which occupied approximately 450,000 square feet, was considering moving to new Class A office space.

In 1987, Hexalon made the decision to reposition the building. The REIT then hired LaSalle Partners to implement the repositioning and manage the property. In early 1989, a three-phase repositioning project was initiated that included improvements to the plaza, lobby, and building systems; an extensive asbestos abatement program; and new tenant finishes (which were made necessary by the abatement program). A significant portion of this internally financed renovation was completed by March 1994. The final phase covering the building's mid-rise portion (floors 13-22) was delayed until November 1995, when the space was vacated, and was completed in 1997.

In May 1997, Beacon Properties Corporation purchased the State Street Bank Building from Hexalon for $275 million (or $254 per gross square foot), and Beacon Management Company took over as the property manager.

Solution: Repositioning: Hexalon Real Estate and LaSalle Partners began the repositioning by taking a hard look at the State Street Bank Building's strengths and weaknesses. Among the building's strengths they counted its desirable downtown location, many advantageous design features such as efficient floorplates and large window bays, the spectacular views of Boston it offered, its proximity to public transportation (in a town where over 75 percent of employees use public transportation), and various amenities – including a spacious plaza and parking. Among the building's most significant weaknesses were the presence of asbestos, antiquated building systems, and some aesthetic drawbacks. The HVAC, fire protection, and elevator systems needed upgrading. The black-slate exterior plaza was nondescript. The wood-paneled lobby was austere, vast, and dark. The tenant-floor finishes were, in most cases, nearly 25 years old.

After comparing the estimated costs of renovation with the expected improvement in lease economics, Hexalon elected to proceed with a major repositioning program in early 1989. At this time, the Boston office market was showing signs of deteriorating. The owner wanted to complete the first phase of the repositioning program before Class A lease rates declined dramatically.

Assessment: The renovation had a significant impact on tenant retention, specifically that of the anchor tenant, State Street Bank. Hexagon's ability to convince State Street Bank that the renovation would transform the building into a facility that would be functionally and aesthetically competitive with new buildings resulted in the tenant renewing its lease for a 20-year term. Another 225,000 square feet of space in the high-rise section was complete and the remaining 250,000-square-foot, mid-rise section was leased to several smaller tenants.

The repositioning of the State Street Bank Building generated an approximate 25 percent improvement in lease economics on the first 700,000 square feet leased after the renovation was started. This represents the approximate difference in rental rates between Class A and Class B buildings in Boston from 1989 to 1992, the period when most of this space was leased. The

building's new rental competitiveness confirms that the renovation has secured the State Street Building's position as one of the city's premier Class A office buildings.

Experience Gained:

LaSalle emphasizes that tenant relations is a key element in the renovation of an occupied building. Developers should do whatever is reasonably possible to minimize disruption of tenants' daily business activities. Communication with tenants and neighboring buildings is vital. Tenants and neighbors are more tolerant of the unavoidable inconveniences caused by a major renovation if they have been fully informed about the program, the plans, and the end result, and if they have up-to-date information concerning current renovation activities.

Tenant relations are also served by giving the project early credibility. The decision to completely renovate half of the lobby before starting the second half turned out to be a winner. Although this was not the least expensive approach, it had the advantage of enabling existing and prospective tenants to fully appreciate the finished product at an early stage.

CASE 31: 640 Memorial Drive, Cambridge, MA (Gause, 1998; Pg 312)

Building: 640 Memorial Drive in Cambridge, Massachusetts, 1913. First multistory automobile assembly plant is now home to light industrial, manufacturing, and office tenants.

Owner: Ford Motor Company

Problem: Functional obsolescence

Reason: Functional obsolescence

Purpose: MIT considered rehabilitating the building for university uses (such as dormitory, administration, or classroom facilities). However, given the property's intrinsic commercial real estate potential, MIT chose to redevelop the historic structure into a commercial asset designed to capture and accommodate the region's expanding high-tech and biotechnology industries.

Solution: Redeveloped by the Massachusetts Institute of Technology (MIT), the 236,250-square-foot, five-story building was transformed into a speculative, multi-tenant biotechnology laboratory and office facility.

The redevelopment was spearheaded by the MIT Real Estate Office, a semi-independent division of the university created in 1977 to maximize the institution's return on real estate assets not used for academic purposes. Acting as the owner, developer, and sole financier of the project, MIT plans to use the property's income to assist in the funding of university-related development initiatives.

Constructed in 1913, the building was one of a variety of similar facilities conceived around the prevailing manufacturing technology – the vertical assembly line. Ford moved its plant elsewhere in 1926, because new horizontal manufacturing procedures had rendered its vertical system obsolete.

MIT acquired the property in 1956 and until 1984 leased the facility to Polaroid, which used it to manufacture components for instant cameras. From 1984 to 1987, part of the building was leased to a video display projection company. When the building became vacant in 1987, MIT began to examine alternatives for the structure's redevelopment.

Convinced that the old assembly plant could generate commercial income, MIT's Real Estate Office recommended that the facility be redeveloped by the university into a commercial asset. But not until 1990 did the MIT board give the go-ahead for the university's real estate office to begin investing hard dollars in the project's development.

Conversion of the building began in August 1991 and was completed in March 1994. MIT had decided early in the project to retain and restore the building's highly decorative façade and other historic characteristics as faithfully as was economically possible.

The building was in excellent condition structurally. The interior support columns required no repair or replacement. The columns were spaced at 23 feet apart, which made the building suitable for office use. However, because the previous use had not required level floors, it was necessary to top the floors with poured concrete to make them even and suitable for office use.

The building's outdated mechanical systems were replaced with two new gas-fired boilers and eight new rooftop HVAC units. In order to market the building as an office and biotech facility, mechanical systems were installed that gave tenants the flexibility to improve the systems as needed. Space on the roof was also provided for tenants to add their own air-handling equipment. Given the age and previous industrial uses of the building, the need for environmental mitigation was minimal.

Assessment: Experience Gained:

MIT's education and research focus gives the institute a unique knowledge of emerging trends in the biotech industry. It took advantage of this knowledge and thereby gained a competitive advantage in the marketplace for this kind of commercial real estate. Also, MIT's ability to finance tenant improvements internally was key to its ability to successfully capture the pent-up demand for biotech office and laboratory facilities in the Boston metropolitan area, because start-up biotech companies did not have access to adequate financial resources.

CASE 32: Kensington Business Center, Tulsa, Oklahoma (Gause, 1998; Pg 318)

Building: The Kensington Business Center in suburban Tulsa is an 814,000-square-foot mixed-use office complex created out of a mixed-use retail mall of the same size that was sold to the developer in 1991 for $12 million.

Owner: Ruffin Properties

Problem: The upscale Kensington Galleria, which was completed in 1984, had failed to capture its intended affluent market and had lost its sole anchor tenant – Dillard's Department Store – and many of its other retailers. But the Galleria's 183,000-square-foot office tower continued to lease and its 407-room hotel limped along with low occupancies.

Reason: The new owner, Ruffin Properties, a property owner / manager based in Wichita, Kansas, with a portfolio of hotels around the United States and 4 million square feet of office and industrial properties in Wichita and Tulsa, saw the handwriting on the wall. The demand in Tulsa was for office space, particularly high-tech office space. The market did not need another mall.

Purpose: In mid-1993, Ruffin convinced United Video Satellite Group (UVSG), a satellite communications giant with five subsidiaries to move its headquarters from elsewhere in Tulsa to the proposed Kensington Business Center, where it would take over the former Galleria mall and a small portion of the former Dillard's. Thus began the lease-driven conversion of the Kensington Galleria to the Kensington Business Center.

Solution: Adaptive re-use.

Assessment: The conversion, which was completed in 1994, includes the office reuse of the 270,000 square feet formerly occupied by the Galleria and Dillard's, a reconfiguring and re-flagging of the hotel, a change in the anchor tenanting for a 51,000-square-foot linear shopping center annex, and few changes to the office tower.

Plans are underway for a Phase 2 expansion of the mixed-use business center, which is expected to add another 228,000 square feet of office space. Tulsa's office market is currently strong. Some office space is renting for $15 per square foot and 1.26 million square feet of space absorbed in 1996, a level not

seen since the early 1980s. However, speculative development will probably not resume until rents reach $18 to $20 per square foot.

Beginning in December 1993, Ruffin Properties executed the build-out of the former mall for UVSG, according to specifications set forth by UVSG. Three of the former mall entrances were retained as office entrances, but their look changed completely.

Many design changes were involved in the building's transformation to Kensington Business Center, but the key to the project's economic viability was that the structure did not require much change. If the developer had had to make sweeping changes to the existing structure, the costs of the conversion would likely have outweighed the rents it could achieve. Rents albeit rising, had not reached a level that would justify new construction. Also important was that much of the necessary infrastructure was in place and suitable for office tenants. Adding expensive new building systems might have cost more than the new use would justify (see the original document for more detail).

The leasing of Kensington Business Center drove the deal. Information discussions between Ruffin and UVSG that indicated the willingness of UVSG to move its Tulsa headquarters to the Kensington Business Center location got the project moving. UVSG's first lease was approximately 75,000 square feet, which it later expanded to 200,000 square feet. Thus, the office space was significantly preleased prior to conversion, although significant preleasing was not a condition of financing since the project was financed by cash put up by Ruffin Properties. The former Dillard's was also completely leased before the project was completed. New leases currently average around $15 per square foot.

With Kensington Business Center 100 percent occupied and Kensington Office Tower 98.5 percent occupied, the owner's current marketing activities are directed at maintaining positive tenant relations. Other maintenance marketing focuses on commercial listings in trade publications.

Experience Gained:

Office use has undergone a paradigm shift, and it is this shift that made Kensington Business Center's former retail space suitable for conversion to office space at a reasonable cost. KBC succeeded in large part because office

employees now share space whereas previously they operated out of private offices, because open office plans and modular furniture have replaced interior walls and traditional office furniture.

This model of retail conversion is replicable. In downtown Tulsa, in fact, the William Center Forum, which is another upscale mall that was built in the late 1970s, is being transformed into office space primarily for the Williams Companies. This conversion will yield large floorplates as did the Kensington Business Center conversion.

Ruffin Properties spent more than a year evaluating alternative retail leasing plans for the mall. But everything kept coming back to the market's strong demand for high-tech office space. Much of the success of this project can be ascribed to good market analysis – and some significant preleasing by credit tenants. Being approached by a good-quality anchor tenant removes a lot of the risk from the project. Fostering and maintaining a good relationship with tenants is of paramount importance to a successful office project.

CASE 33: Montgomery Park, Portland, Oregon (Kiell, 1992; Pg 132)

Building: Montgomery Ward Warehouse, Portland, Oregon, 1921

Owner: H. Naito Properties

Problem: A number of developers investigated the property, but Portland's real estate market appeared to be too soft to absorb such a great amount of space. The sheer size and dimension of the building – 790,000 square feet with 77,000-square-foot floor plates – repeatedly sank ideas for projects and made renovation seem almost as unthinkable as the thought of demolishing it. The property stayed shuttered and untouched for eight years.

Reason: Since 1921, the Montgomery Ward warehouse has been an imposing presence on the northwest edge of Portland's urban center. Many referred to the U-shaped structure as Portland's Parthenon. When Montgomery Ward closed operations at the warehouse in 1976, it seemed unthinkable to tear it down. It was a prominent part of the city landscape, held a vital part in the city's history, and represented an important retail legacy.

Purpose: The developer saw a need for space for those who required conference and trade-show facilities on a slightly smaller scale than would be available in the new convention center then being built in Portland. And he realized that he could offer unique office space as well in the property.

Solution: Adaptive reuse

Assessment: In 1984, Naito purchased the building and 17 acres of land for $6 million. Then he spent $30 million on the conversion. A 77,000-square-foot plate clearly creates an atypical leasing situation. Developer Naito saw the property's larger-than-life size and aura as a potential marketing advantage. Naito's second leasing advantage was that he was able to offer rents that were substantially below market. Where Portland's downtown office market offered space at $15 to $20 a square foot, Montgomery Park was leased at approximately $10 a square foot.

CASE 34: 777 California Avenue, Palo Alto, California (Kiell, 1992; Pg 138)

Building: 777 California Avenue, Palo Alto, California, Age: 33 years

Owner: Marcus & Millichap real estate development company, 1988

Problem: In the feasibility and evaluation stages of the project, one of the primary questions raised was: Should a major renovation of the warehouse be undertaken, or should the old structure be demolished and new construction undertaken on the site? Foremost was the fact that the existing warehouse footprint on the three-acre site exceeded the present-day allowable lot coverage. This meant a new building would have to be smaller than the present warehouse, which wouldn't meet the company's aims; or it would have to be multi-story. Rapidly, it became obvious that a great deal more red tape would be encountered if Marcus & Millichap took the new-construction route.

Reason: In 1988, the real estate development company Marcus & Millichap bought 777 California Avenue, a 33-year-old book warehouse two blocks from their headquarters that they saw as occupying an excellent location for more office space to meet their rapidly expanding requirements.

Purpose: The challenge was to take a featureless tilt-up, concrete warehouse and turn it into a high-profile office building.

Solution: Adaptive reuse / conversion

Assessment: Beyond the many design changes to convert the warehouse into office space, there were many upgrades and additions that were required in the mechanical systems. The total development costs for the conversion of 777 California Avenue came to $14.4 million. These broke down to $6.94 million in land costs, including zoning and utility fees; $6.84 million in construction costs; and $620,000 in development fees.

CASE 35: Michelson Court, Irvine, California (Kiell, 1992; Pg 179)

Building: Michelson Court, Irvine, California, 1972

Owner: Fujita Corporation, 1989

Problem: The property's condition and anonymity could be explained by its tenant history. For the 17 years preceding the sale, the building was leased solely to one defense-oriented tenant. Their space requirements expanded and contracted over this period, which meant that they often sublet surplus space, sometimes as much as 20,000 of the total 42,000 square feet. The interior condition of the property was poor. It was mired in outmoded, tired 1970s styles, and had suffered from a potluck, piecemeal approach to repair, remodeling, and renovation in the past. There were many code deficiencies. However since the building is only two stories, fortunately, many sorts of retrofit work that would be required of high rises for code reasons were not required of Michelson Court.

Reason: Michelson Court's strongest asset for repositioning was its location. It is at the intersection of Michelson and Von Karman, two very well known streets, and very close to two major freeways and the Orange County Airport, which has gone through a recent major enlargement of its facilities.

Purpose: Michelson Court originally had no name and an unknown address. From a marketing perspective, a key step in repositioning the property was to provide it with an identity. Enhancing the curb appeal of Michelson Court was the other basic strategy for repositioning the project. Koll decided the building had to get away from being single-user; they felt that its highest and best use long-term was as a multi-tenanted environment. The most appropriate tenant size to target was the 750 – 1,000-square-foot user. The key to attracting these smaller users and obtaining the new rental rates was to upgrade the look of the property, to create the curb appeal.

Solution: Renovation of the 42,000-square-foot, two-story walkup office building

Assessment: A starting point for Koll in developing its repositioning and remarketing strategy was to learn the owner's objectives, which included the facts such as; the property would be hold for a very long-term, there would be no debt on the

property and the Japanese-owned company didn't want to put any additional funds into the project. Any improvements had to be funded from the cash flow of the property.

CASE 36: Huntington Building, Cleveland, Ohio (Kiell, 1992; Pg 205)

Building: Huntington Building, Cleveland, Ohio, 1924

Owner: SWH Management, Inc.

Problem: The project was to be a "quiet rehab". That is, the renovation had to be executed while minimizing the disturbance to the tenants in the 1.3 million-square-foot, 21-story building in downtown Cleveland. The challenge was that, when the program started, the occupancy rate was 97 percent and was never lower than 85 percent during the program.

Reason: The building's excellent location in the center of Cleveland was a prime reason for its success but that at the same time the market was always changing and becoming increasingly competitive. When several larger tenants indicated plans to move to newly constructed office towers, the owners of the property recognized that serious measures were required to help the building retain its tenants.

Purpose: To retain the tenant-base by renovating a large, fully occupied skyscraper with a creative project scheduling.

Solution: Renovation

Assessment: To make the renovation program succeed, a substantial amount of the work schedule was set outside of regular business hours – at night and during weekends, which later noted that did not have a dramatic effect on labor costs. The overall project was budgeted at $20 million, $16 million for hard costs and $4 million for soft costs, and included: upgrading of systems –life safety, plumbing, electrical– especially with regard to capacity, raising conditions of infrastructure components to meet current building codes; replacement of all of the windows; and renovation of common areas –lobbies, corridors, and elevators. By the end of 1991 the renovation was almost 100 percent finished.

CASE 37: Curtis Center, Philadelphia, Pennsylvania (Kiell, 1992; Pg 210)

Building: Curtis Center, Philadelphia, Pennsylvania, 1916

Owner: Kevin F. Donohoe Company, Inc.

Problem: The building had been hailed as an architectural and engineering achievement at its completion in 1916. But by the 1980s it had slowly degenerated into a partially occupied, second-class office building.

Reason: The most obvious attribute favoring renovation was the Curtis Center's unbeatable location; it sits at the corner of Walnut and Sixth Streets, in the heart of Philadelphia's historic district, facing Washington Square on the south and Independence Mall on the east. A close second was the historic significance of a building that carried the name of a publishing firm that had long been one of the most significant companies in the city. Third, although dulled and damaged by time, the architectural and artistic elements of the property were excellent examples of the Beaux Arts style.

Purpose: The objective of the renovation program for the Curtis Center, a 75-year-old, 1.1 million-square-foot, 12-story brick building that was the headquarters for a major magazine publisher was to restore the architectural grandeur of the building while bringing it up to the 1980s office building standards in every respect.

Solution: Renovation

Assessment: In order to make the renovation succeed and turn the property into a viable office building in today's market, the developer made a number of major transformations within the building, both on aesthetic and functional levels. The aesthetic focal point of the project was the conversion of a central, open delivery courtyard into the spectacular, enclosed 12-story Fountain Court atrium. Functionally, the building now equals the newest of office towers. An important part of the renovation program was to upgrade the amenities and services in the building along with the physical improvements. The renovation price tag was $110 million.

CASE 38: International Place, Rosslyn, Virginia (Kiell, 1992; Pg 236)

Building: International Place, Rosslyn, Virginia, 1967

Owner: London & Leeds Development Corporation, 1987

Problem: General Services Administration had occupied the 12-story, 275,000-square-foot office building, named Plaza West then, since it was opened in 1967, till London & Leeds Development Corporation acquired it twenty years later. Before London & Leeks took control of the property, GSA had moved out. The building now had 241,000 square feet of office space, all vacant. Years of occupancy by a single tenant had let it slip firmly into a Class B categorization in the minds of the brokerage community, which in any case had had little reason to pay much attention to the property. The façade of the building was outdated, poorly kept up, and energy-inefficient.

Reason: Plaza West was a building that had become outdated in both its systems and its design. But, having been a mid-'70s vintage property, it lacked the age and especially the style to warrant any sort of historic status. If economics warranted, any part of the building could be replaced, and the plan that evolved involved replacing virtually everything.

Purpose: Through a $20 million project, a 20-year-old building was completely transformed, producing a product that would be perceived and function as brand new, competing with other new projects in attracting high-quality tenants. A gut renovation to turn a tired Class B property into a renewed Class A structure.

Solution: Renovation

Assessment: Except for its concrete framework, the building that emerged from the renovation as International Place was a brand-new building, which because of its entirely new design, its new systems, and its ideal location could be marketed as Class A. The demolition phase consisted of removing the existing exterior skin, all interior ceiling, wall, and floor finishes, all of the elevators, as well as the entire mechanical and electrical systems. The architects of the renovation took advantage of the long, narrow configuration, which superficially may appear ungainly, to allow natural sunlight to reach almost

the entire core; this was an opportunity missed by the pre-renovation structure. By April 1992, the occupancy of the property was 90 percent.

CASE 39: 30 North LaSalle, Chicago, Illinois (Kiell, 1992; Pg 255)

Building: North LaSalle, Chicago, Illinois, 1975

Owner: Prudential Property Company

Problem: The property was faced with a huge challenge when the largest tenant in the 43-floor office tower decided to depart. Floors 2 through 16, with an average floor plate of 21,000 square feet, would be empty.

Reason: N/A

Purpose: The releasing of the space could be approached by filling the floors up bit by bit. But the owner and leasing manager decided to take advantage of the unusual large chunk of space and market it whole, if possible.

Solution: To do so, they developed the "building within a building" concept. They would offer a minimum half of the 300,000 square feet of space, eight to 15 floors. The tenant taking the lease would get a separate street-side entrance with prominent exterior signage and a two-story private atrium lobby. If they took the entire offered space, they would get a private bank of eight elevators; if they took the minimum of eight floors, the bank would have four elevators.

Assessment: Because the space had been previously leased to the trust department of Continental Bank, most of these lower floors were already elegantly finished. A 13,000-square-foot executive dining room was one amenity that could be maintained and included in the package. The building-within-a-building concept was offered in conjunction with a major renovation effort of the entire building, especially work on the façade of the tower and on the sidewalks. The owner/manager realized that offering half to all of the block of floors as one package was an all-or-nothing approach to some degree; but they also saw it as an opportunity, a way to give the building a certain prestige and offer prestige as well to a potential tenant.

CASE 40: Nonconnah Corporate Center, Memphis, Tennessee (Kiell, 1992; Pg 280)

Building: Nonconnah Corporate Center, Memphis, Tennessee, 1970

Owner: AmberJack Ltd.

Problem: Office / distribution centers that were originally constructed in 1970s and considered state of the art at the time now recognize the need to be updated in order to compete with the latest office / industrial space on the market. Nonconnah Corporate Center, a 290-acre business park located in the airport area of Memphis, Tennessee, had not changed its appearance since the first space was constructed in 1970. Over a 15-year period, tremendous growth occurred within the park, but no updating of the park's appearance had taken place. Nonconnah needed an improved identity and greater public awareness.

Reason: By 1984 the center and the area around it had grown so much that the city and state committed to developing a new interchange on I-40. A second entrance into Nonconnah was integrated into the new interchange. This improved the park's accessibility, but the owner and management team realized that Nonconnah needed a complete facelift.

Purpose: Nonconnah's re-imaging was conceived so that it would not only compete with the airport market but also with the entire Memphis market.

Solution: Renovation: "Image is everything"

Assessment: When the image planner analyzed the project and the Memphis real estate market, he determined that although the park was well designed for that time period (the 1970s) and market, it was delivering conflicting messages, and ultimately had no underlying thread to lace its diverse components together as one. At that time the center consisted of office/service space, Class A office space, warehousing, and hotel facilities. With the construction of the new highway interchange, the original main entrance became the "back entrance". The image planner took the opportunity to establish an entirely new "front door" project, followed by directional and building identification signs throughout the entire park. This gave the center the feeling of unity it formerly lacked and tied together the various architectural styles. The renovation of the park continued with a landscaping program adding numerous street trees, shrubs, and plants at intersections, medians, and the main entrance.

APPENDIX D: Cases used in the SPSS database*

NO	PNAME	HISTORY	LOCATION	STATE	ORIGINAL
1	Barton Academy (NR)	1	Mobile, Alabama	1	Barton Academy
2	Mobile County Department of Pensions & Se	1	Mobile, Alabama	1	Mobile City Hospital
3	French Flats	9	Fort Payne, Alabama	1	Boarding house
4	Murphy House (NR)	1	Montgomery, Alabama	1	Private residence
5	Robertson Banking Company Building	9	Demopolis, Alabama	1	Mayer Brothers Department Store
6	FABCO Building	9	Little Rock, Arkansas	5	Department store (The Blass Building)
7	Blue Print Furniture	9	Los Angeles, California	6	Bank
8	Canned Foods, Inc., Corporate Offices	9	Berkeley, California	6	Auto dealership
9	Citadel	9	Commerce, California	6	Factory
10	San Francisco Bar Pilots Station House	9	San Francisco, California	6	Warehouse
11	Sony Game Show Network Building	9	Culver City, California	6	Auto repair shop / warehouse
12	355 Bryant Street Lofts	9	San Francisco, California	6	Warehouse
13	601 Fourth Street Lofts	9	San Francisco, California	6	Warehouse
14	Cooper House	9	Santa Cruz, California	6	Santa Cruz County Courthouse
15	China Basin Building	9	San Francisco, California	6	Produce warehouse
16	The Feather Factory	9	San Francisco, California	6	Feather processing plant
17	Ghirardelli Square	9	San Francisco, California	6	Ghirardelli Chocolate Company
18	Musto Plaza	9	San Francisco, California	6	Marble cutting factory
19	450 Pacific Avenue Building	9	San Francisco, California	6	Warehouse
20	The Stanford Barn	9	Palo Alto, California	6	Winery (later a dairy barn)
21	Pueblo Union Depot	9	Pueblo, Colorado	7	Train depot
22	Blake Street Bath and Racquet Club	9	Denver, Colorado	7	Light industry and boarding rooms
23	The Cable Building	9	Denver, Colorado	7	Powerhouse, offices and shops for cable cars
24	Tivoli (NR)	1	Denver, Colorado	7	Tivoli Brewery Company complex
25	Union Railroad Station (NR)	1	New London, Connecticut	8	Union Railroad Station
26	Aetna Health Plans Headquarters at Blue Hen	9	Dover, Delaware	9	Regional mall anchor store
27	Customs House (NR)	1	Wilmington, Delaware	9	U.S. Customs House
28	Montchanin Mills Building	9	Montchanin, Delaware	9	Dupont Company mill
29	National Trust for Historic Preservation (NR)	1	Washington, D.C.	10	McCormick (later Mellon) Apartments
30	Canal Square	9	Washington, D.C.	10	IBM Warehouse
31	CFC Square (South)	9	Washington, D.C.	10	Warehouse
32	The Olympia Apartments	9	Miami, Florida	12	Office & retail space
33	220 East Forsyth Street	9	Jacksonville, Florida	12	McMurray Livery Stable (later the Court House G
34	Rafford Hall (NR)	1	Pensacola, Florida	12	Pensacola Athletic Club
35	Georgia State University, College of Business	9	Atlanta, Georgia	13	Bank headquarters / Office Building
36	The Suite Hotel at Underground Atlanta	9	Atlanta, Georgia	13	Office building
37	King Plow Arts Center	9	Atlanta, Georgia	13	Farm equipment manufacturing plant
38	Nexus Contemporary Art Center	9	Atlanta, Georgia	13	Garage
39	Fire station #6	9	Atlanta, Georgia	13	Fire station
40	Lyman Hall at Georgia Institute of Technology	9	Atlanta, Georgia	13	Adjoining classroom buildings
41	Ponce de Leon Clinic	9	Atlanta, Georgia	13	Presbyterian headquarters
42	Old Idaho State Penitentiary (NR)	1	Boise, Idaho	16	Idaho State Penitentiary
43	DePaul Center	9	Chicago, Illinois	17	Department Store
44	Solomon Schechter Day School	9	Northbrook, Illinois	17	Office building
45	Woodstock City Hall	9	Woodstock, Illinois	17	Woodstock Central School
46	Glessner House (NHL)	2	Chicago, Illinois	17	Private residence
47	428 Maine Building	9	Quincy, Illinois	17	State Savings Loan and Trust Company
48	Indiana Farm Bureau Insurance Headquarters	9	Indianapolis, Indiana	18	Manufacturing
49	Shadeland Commerce Center	9	Indianapolis, Indiana	18	Auto plant
50	Jefferson County Memorial Forest Welcome C	9	Fairdale, Kentucky	21	School
51	Horine Manor House	9	Fairdale, Kentucky	21	Residential
52	Allen House, Inc. (NR)	1	Louisville, Kentucky	21	Firehouse
53	Jail Arcade (NR)	1	Louisville, Kentucky	21	Jefferson County Jail
54	Haddie Bishop Speed House (NR)	1	Louisville, Kentucky	21	Private residence
55	Actors Theatre	9	Louisville, Kentucky	21	Bank of Louisville
56	Piazza d'Italia	9	New Orleans, Louisiana	22	Warehouses and mercantile buildings
57	111 Rue Iberville Building (NHL)	2	New Orleans, Louisiana	22	Louisiana Sugar Refinery Warehouse
58	Hagerstown Telework Center	9	Hagerstown, Maryland	25	Department Store / Furniture Store
59	Orchard Street Church	9	Baltimore, Maryland	25	Church & school
60	Deer Island Reception / Training Building	9	Boston, Massachusetts	26	Steam pumping station
61	The Shop at Whitinsville	9	Whitinsville, Massachuset	26	Manufacturing
62	Boston's Old City Hall (NHL)	2	Boston, Massachusetts	26	Boston City Hall
63	Chauncy House	9	Boston, Massachusetts	26	Offices
64	One Winthrop Square (NR)	1	Boston, Massachusetts	26	Mercantile building
65	The Tannery	9	Peabody, Massachusetts	26	A. C. Lawrence Leather Corporation
66	Piano Craft Guild	9	Boston, Massachusetts	26	Chickering piano factory
67	The Prince Building (NR)	1	Boston, Massachusetts	26	Prince Spaghetti Factory
68	Faneuil Hall Marketplace (NR)	1	Boston, Massachusetts	26	Wholesale food market
69	Coolidge Bank and Trust Company	9	Cambridge, Massachusetts	26	Gas station

** See abbreviations section on page vi for the SPSS dataset encoding.*

NO	PNAME	HISTORY	LOCATION	STATE	ORIGINAL
70	1455 Centre Street	9	Detroit, Michigan	27	Warehouse
71	Detroit Cornice and Slate (NR)	1	Detroit, Michigan	27	Sheet metal and stone factory
72	Landmark Center (NR)	1	St. Paul, Minnesota	28	Old Federal Courts Building
73	Butler Square (NR)	1	Minneapolis, Minnesota	28	Warehouse
74	Oxford City Hall	9	Oxford, Mississippi	29	United States Post Office and federal building
75	E. E. Cooley Building (NR)	1	Starkville, Mississippi	29	John M. Stone Cotton Mill
76	CEMREL	9	St. Louis, Missouri	30	City buildings for the poor, chronically ill, and ins
77	Team Four, Inc.	9	St. Louis, Missouri	30	Newstead Avenue Police Station
78	LIVINGreen	9	Omaha, Nebraska	32	Light industrial
79	Citibank Depot Drive-up (NR)	1	Lincoln, Nebraska	32	Chicago Rock Island and Pacific Railroad Passeng
80	Ideal Laundry Building	9	Fremont, Nebraska	32	Warehouse for wholesale produce (later a laundry
81	Contoocook Mills Industrial District (NR)	1	Hillsboro, New Hampshire	34	Hillsboro Hosiery Mill complex
82	One Mill Plaza (NR)	1	Laconia, New Hampshire	34	Busiel-Seeburg Mill
83	Zion and Breen Associates, Inc.	9	Imlaystown, New Jersey	35	Salter's Mill
84	Medical Office	9	Smithtown, New York	37	Inn
85	Medical Office	9	Smithtown, New York	37	Farmhouse, private residence
86	Jefferson Market Regional Branch Library (N	1	New York, New York	37	Jefferson Market Courthouse
87	Clinton House (NR)	1	Ithaca, New York	37	Hotel
88	Saratoga Springs Drink Hall (NR)	1	Saratoga Springs, New Yo	37	Trolley Station
89	Old City Hall Restaurant (NR)	1	Lockport, New York	37	Flour Mill (later Lockport City Hall)
90	Stephens Square	9	Binghamton, New York	37	Warehouse
91	Warehouse Apartments	9	Binghamton, New York	37	Warehouse
92	Bedford - Stuyvesant Commercial Center	9	Brooklyn, New York	37	Industrial buildings
93	The Hallie Flanagan Davis Powerhouse Theat	9	Poughkeepsie, New York	37	Electrical powerhouse
94	Old Saratoga Square	9	Saratoga Springs, New Yo	37	Young Men's Christian Association
95	CAG Building and Highland Apartments	9	Utica, New York	37	St. Luke's Home and Hospital
96	Atherton Mill	9	Charlotte, North Carolina	38	Manufacturing
97	Latta Arcade (NR)	1	Charlotte, North Carolina	38	Office arcade
98	The Cotton Exchange	9	Wilmington, North Caroli	38	Nine mercantile buildings
99	The AIA Tower (NR)	1	Raleigh, North Carolina	38	Raleigh Water Tower
100	Mercantile Stores Co., Inc., Corporate Headq	9	Cincinnati, Ohio	41	Furniture warehouse
101	German Village Center (NR)	1	Columbus, Ohio	41	St. Mary's School
102	Quaker Square	9	Akron, Ohio	41	Grain storage and packing plant
103	Brook Theatre	9	Tulsa, Oklahoma	42	Movie theater with office space and adjacent sry cl
104	Old City Hall (NR)	1	Tulsa, Oklahoma	42	City hall
105	United States Hotel Building (NHL)	2	Jacksonville, Oregon	43	United States Hotel
106	Stochman's Building	9	Ontario, Oregon	43	Moore Hotel
107	Galleria	9	Portland, Oregon	43	Rhodes Department Store
108	Philadelphia Arts Bank	9	Philadelphia, Pennsylvani	45	Bank and office space
109	The Bellevue	9	Philadelphia, Pennsylvani	45	Hotel
110	National Bank of the Commonwealth (NR)	1	Indiana, Pennsylvania	45	Indiana County Courthouse
111	The Bank Center	9	Pittsburgh, Pennsylvania	45	Bank buildings
112	Burke's Building (NR)	1	Pittsburgh, Pennsylvania	45	Real estate and tax office
113	Station Square (NR)	1	Pittsburgh, Pennsylvania	45	Pittsburgh and Lake Erie Railroad Station
114	Pembroke Square at Peabody Place	9	Memphis, Tennessee	50	Department Store
115	50 Peabody Place	9	Memphis, Tennessee	50	Furniture store & warehouse
116	United American Bank	9	Nashville, Tennessee	50	Noel Hotel
117	Gassner Nathan and Partners	9	Memphis, Tennessee	50	Memphis Elevator Company
118	Dallas Area Rapid Transit (DART) Headquart	9	Dallas, Texas	51	Department Store
119	The Exchange Building	9	San Antonio, Texas	51	Office
120	SEDCO Inc.	9	Dallas, Texas	51	Cumberland High School
121	River Square	9	San Antonio, Texas	51	Commercial building
122	Blum Building (NHL)	2	Galveston, Texas	51	Wholesale house
123	River Square	9	San Antonio, Texas	51	Warehouse
124	North Bennington Railroad Station (NR)	1	North Bennington, Vermo	53	North Bennington Railroad Station
125	The Ice House	9	Burlington, Vermont	53	Ice house (later a mattress company)
126	Old Female Charity School (NR)	1	Fredericksburg, Virginia	55	Female Charity School
127	309 - 311 Cameron Street	9	Alexandria, Virginia	55	Norford Inn
128	Richard Johnston House (NR)	1	Fredericksburg, Virginia	55	Private residence
129	Kent-Valentine Carriage House (NR)	1	Richmond, Virginia	55	Carriage house and servants quarters
130	The Ironfronts (NR)	1	Richmond, Virginia	55	Stearns Block
131	Crilley Warehouse (NHL)	2	Alexandria, Virginia	55	Hill Steam Cracker Manufactory
132	Port of Seattle Headquarters	9	Seattle, Washington	56	American Can Company
133	SODO Center	9	Seattle, Washington	56	Catalog distribution center
134	Tacoma Union Station	9	Tacoma, Washington	56	Train station
135	All-City Credit Union	9	Everett, Washington	56	Residence
136	Monte Cristo	9	Everett, Washington	56	Hotel
137	Old City Hall (NR)	1	Tacoma, Washington	56	City Hall
138	Old Courthouse Apartments (NR)	1	Moorefield, West Virginia	57	Hardy County Courthouse
139	Ashland City Hall (NR)	1	Ashland, Wisconsin	58	Post office and federal office building

OLDUSE	CONVERTED	NEWUSE	CONSYEAR	CONSYRG	COYEAR	COYRG	AGE
5	Offices for county school board	1	1836	4	1969	2	133
5	Public administrative offices	1	1834	4	1975	3	141
2	Dental office and apartments	8	1889	6	1973	3	84
2	Offices	1	1851	5	1970	2	119
3	Bank and insurance agency	1	1897	6	1975	3	78
3	Offices and data processing center	1	1913	7	1975	3	62
1	Furniture store	3	1931	8	1989	6	58
3	Office & retail space	8	1934	8	1992	7	58
4	Office & retail space	8	1929	8	1991	7	62
4	Office headquarters	1	1932	8	1990	6	58
9	Office, broadcast studio	8	1930	8	1994	7	64
4	Live / work loft condominiums	8	1916	7	1992	7	76
4	Live / work condominiums	8	1915	7	1990	6	75
1	Commercial uses (two commercial banks & a shopping complex)	8	1895	6	1971	3	76
4	Offices	1	1920	7	1973	3	53
4	Offices and showrooms	8	1919	7	1973	3	54
8	Commercial space (seventy shops, 14 restaurants, and two theate	9	1893	6	1964	1	71
4	Offices	1	1906	7	1970	2	64
4	Offices	1	1907	7	1973	3	66
4	Commercial (shopping store) and office space	8	1888	6	1977	3	89
6	Office, retail & residential space, restaurant and catering hall	8	1889	6	1996	7	107
4	Condominiums and offices	8	1890	6	1976	4	86
8	Commercial (restaurant and retail) space and offices	8	1889	6	1973	3	84
1	Commercial center (a shopping, entertainment, and recreation ce	9	1890	6	1977	4	87
6	Amtrak passenger station, commercial and office space	8	1885	6	1976	4	91
3	Office	1	1960	9	1994	7	34
1	Offices & bank	1	1855	5	1976	4	121
4	Commercial, office and warehouse use	8	1870	5	1970	2	100
2	Offices, scheduled for completion in 1979	1	1917	7	1979	4	62
4	Commercial (shopping)and office uses	8	1880	6	1971	3	91
4	Commercial, offices, and restaurant	8	1927	8	1977	4	50
8	Residential & retail space	9	1926	8	1996	8	70
6	Offices and parking garage	8	1902	7	1973	3	71
7	Offices and community center	8	1890	6	1976	4	86
1	Georgia State University, College of Business Administration bu	5	1901	7	1993	7	92
1	Hotel	2	1915	7	1990	6	75
4	Live / work art studios	8	1914	7	1995	7	81
6	Art gallery / artist studios	8	1923	7	1993	7	70
6	Museum & Office	8	1894	6	1995	7	101
5	Offices	1	1906	7	1991	7	85
1	Medical clinic & offices	1	1962	9	1993	7	31
7	Historic, recreational, and commercial complex	8	1870	5			
3	Offices, retail space, classrooms	8	1914	7	1993	7	79
1	School	5	1982	10	1994	7	12
5	Municipal offices	1	1906	7	1975	3	69
2	Museum, offices and meeting spaces	8	1886	6	1966	2	80
1	Offices and art facilities	8	1892	6	1966	2	74
4	Office	1	1922	7	1992	7	70
4	Office & industrial space	8	1954	9	1991	6	37
5	Visitors center	1	1914	7	1994	7	80
2	Meeting facility & office space	8	1942	8	1992	7	50
6	Commercial space (a studio for interior design)	8	1873	5	1971	3	98
7	Commercial and office space	8	1905	7			
2	Offices	1	1885	6	1975	3	90
1	Repertory theater	7	1834	4	1972	3	138
4	Commercial and office space	8	1860	5	1977	4	117
4	Offices and restaurant	8	1888	6	1971	3	83
3	Telework Center	1	1930	8	1995	7	65
5	Office & Museum	8	1882	6	1993	7	111
6	Office & meeting facilities	8	1894	6	1994	7	100
4	Light industrial & office	8	1847	4	1989	6	142
1	Commercial and office space	8	1865	5	1971	3	106
1	Apartments	2	1921	7	1975	3	54
1	Commercial and office space	8	1873	5	1974	3	101
1	Apartments	2	1814	3	1972	3	158
4	Artists' housing and studios	8	1853	5	1974	3	121
4	Apartments and offices	8	1917	7	1966	2	49
3	Specialty retail / restaurant and office complex	8	1826	4	1978	4	152
6	Bank	1	1930	8	1971	3	41

OLDUSE	CONVERTED	NEWUSE	CONSYEAR	CONSYRG	COYEAR	COYRG	AGE
4	Commercial and office space	8	1911	7	1974	3	63
4	Offices and restaurant	8	1897	6	1975	3	78
1	Civic center for the arts, history and education	5	1892	6	1977	4	85
4	Retail / office complex	8	1906	7	1974	3	68
8	Municipal offices	1	1886	6	1975	3	89
4	University offices and maintenance shops	8	1902	7	1968	2	66
8	Educational research facility	5	1900	6	1973	3	73
6	Design and planning offices	1	1905	7	1973	3	68
4	Showroom offices & warehouse	8	1912	7	1994	7	82
6	Drive-up banking facility	1	1893	6	1969	2	76
4	Offices	1	1884	6	1975	3	91
4	Apartments, offices, and commercial space	8	1846	4	1972	3	126
4	Offices	1	1857	5	1973	3	116
4	Offices	1	1897	6	1972	3	75
2	Medical office	1	1725	1	1994	7	269
2	Medical office	1	1726	1	1992	7	266
1	Public library	5	1876	6	1967	2	91
2	Offices, museum, and commercial space	8	1830	4	1975	3	145
6	Offices	1	1915	7	1977	4	62
8	Restaurant and museum	9	1860	5	1976	4	116
4	Commercial and office space	8	1888	6	1976	3	88
4	Apartments and offices	8	1898	6	1971	3	73
4	Commercial, office, and recreational uses	8	1900	6	1975	3	75
6	Drama workshop	1	1912	7	1972	3	60
5	Commercial and office use	8	1870	5	1976	4	106
2	Apartments and offices	8	1905	7	1968	2	63
4	Office & retail space	8	1916	7	1993	7	77
1	Commercial and office space	8	1914	7	1968	2	54
1	Shopping center and offices	8	1800	3	1976	4	176
6	Offices	1	1887	6	1963	1	76
4	Office	1	1972	9	1992	7	20
5	Offices	1	1887	6	1972	3	85
4	Commercial and office space	8	1875	5	1975	3	100
8	Office, retail, health club, and conference center	8	1940	8	1995	7	55
1	Offices	1	1919	7	1974	3	55
2	Bank	1	1880	6	1965	1	85
2	Commercial space and offices (retail and restaurant)	8	1911	7	1976	4	65
2	Shopping mall and offices	8	1906	7	1976	4	70
1	Performing arts theater	5	1928	8	1994	7	66
2	Hotel, office and retail space, athletic club	8	1904	7	1989	6	85
1	Bank	1	1870	5	1974	3	104
1	Speciality shopping center and office tower	8	1890	6	1976	4	86
1	Commercial space, offices and apartments	8	1836	4	1974	3	138
6	Commercial (shopping, office and hotel space)	8	1901	7	1979	4	78
3	Apartments, office and retail space	8	1900	6	1996	8	96
9	Office & retail space	8	1890	6	1995	7	105
2	Bank	1	1930	8	1973	3	43
1	Offices	1	1910	7	1968	2	58
3	Office	1	1964	9	1992	7	28
1	Apartments & retail	9	1925	7	1994	7	69
5	Offices	1	1888	6	1971	3	83
8	Commercial and office space	8	1923	7	1968	2	45
4	Commercial space and offices (retail and restaurant)	8	1870	5	1977	4	107
4	Commercial, office, and residential spaces	8	1875	5	1976	4	101
6	Village and private offices (village offices and meeting spaces, ar	1	1879	6	1972	3	93
4	Restaurant and office	8	1868	5	1976	4	108
5	Offices	1	1835	4	1977	4	142
2	Commercial space(retail shops), offices and apartments	8	1817	3	1975	3	158
2	Commercial (shops) and office space	8	1799	2	1975	3	176
2	Offices	1	1840	4	1972	3	132
8	Commercial and office space	8	1867	5	1976	4	109
4	Commercial space and offices (retail and restaurant)	8	1895	6	1976	4	81
1	Port of Seattle administrative headquarters	1	1930	8	1993	7	63
4	Office, retail & industrial space	8	1912	7	1996	8	84
6	Courthouse	1	1911	7	1992	7	81
2	Office (bank)	1	1892	6	1992	7	100
2	Residential, office, retail and art gallery	8	1925	7	1993	7	68
1	Commercial space (a shopping and restaurant complex)	3	1893	6	1974	3	81
1	Apartments	2	1792	2	1972	3	180
8	Municipal offices	1	1894	6	1976	4	82

AGERG	GAREASQ	GAREASM	GAREARG	ACQTYPE	ACQCOST	ACQCOSTA	ACQCRG	DEVCOST	DECOSTA
6	60000	5574.1800	3	3				$2,000,000	$7,331,200
6	32000	2972.8960	2	3				$1,560,000	$3,990,324
4	6000	557.4180	1	1	$6,500	$19,680	2	$40,000	$121,108
5	16000	1486.4480	2	1	$80,000	$278,064	2	$370,000	$1,286,046
4	36391	3380.8331	2	5				$700,000	$1,790,530
3	80000	7432.2400	3	5				$2,950,000	$7,545,805
3	12500	1161.2875	2	2				$100,000	$119,930
3	42000	3901.9260	2					$4,700,000	$5,109,370
3	420000	39019.2600	4						
3	19000	1765.1570	2	2					
3	13220	1228.1777	2						
4	85000	7896.7550	3	1	$2,800,000	$3,043,880	4	$5,800,000	$6,305,180
4	120000	11148.3600	4	1	$5,700,000	$6,590,910	4	$8,100,000	$9,366,030
4	21000	1950.9630	2	1	$75,000	$248,280	2	$600,000	$1,986,240
3	120000	11148.3600	4	3				$1,656,000	$5,013,871
3	30000	2787.0900	2	1	$190,000	$575,263	3	$350,000	$1,059,695
3	180000	16722.5400	4	1	$2,500,000	$10,642,250	4	$10,000,000	$42,569,000
3	41728	3876.6564	2					$459,843	$1,598,322
3	28000	2601.2840	2					$950,000	$2,876,315
4	40000	3716.1200	2	2	$1,000,000	$2,219,500	4	$500,000	$1,109,750
5	50000	4645.1500	2	1	$250,000	$250,000	3	$2,500,000	$2,500,000
4	22000	2043.8660	2	1	$125,000	$298,213	3	$500,000	$1,192,850
4	53750	4993.5363	2						
4	160000	14864.4800	4	2				$6,800,000	$15,092,600
4	20000	1858.0600	2	1	$11,400	$27,197	2	$615,000	$1,467,206
2	90000	8361.2700	3						
5	10200	947.6106	1	1	$115,000	$274,356	3	$165,000	$393,641
5	15300	1421.4159	2	3					
3	70000	6503.2100	3	1	$1,300,000	$2,501,720	4	$1,900,000	$3,656,360
4	150000	13935.4500	4					$2,400,000	$7,944,960
3	107000	9940.6210	3					$4,700,000	$10,431,650
3	55000	5109.6650	3	2					
3	17152	1593.4723	2	1	$102,911	$311,584	3	$210,616	$637,682
4	7912	735.0485	1	4				$100,000	$238,570
4	196417	18247.7286	4	4				$2,000,000	$2,126,000
4	127500	11845.1325	4	1	$1,100,000	$1,271,930	4	$14,200,000	$16,419,460
4	165000	15328.9950	4	3				$7,250,000	$7,389,200
3	34039	3162.3252	2	1	$350,000	$372,050	3	$1,300,000	$1,381,900
5	5760	535.1213	1	2				$800,000	$815,360
4	42000	3901.9260	2	3				$2,861,400	$3,189,030
2	45000	4180.6350	2					$3,500,000	$3,720,500
	2.22156e+007	2063895.8868	6	3					
4	650000	60386.9500	5	1	$3,000,000	$3,189,000	4	$62,000,000	$65,906,000
1	110000	10219.3300	4	1	$1,700,000	$1,769,190	4	$6,400,000	$6,660,480
3				1	$50,000	$127,895	2	$188,661	$482,576
4	20000	1858.0600	2	1	$35,000	$143,406	2	$400,000	$1,638,920
3	18000	1672.2540	2	1	$50,000	$204,865	2	$350,000	$1,434,055
3	387776	36025.5537	4	1	$4,769,000	$5,184,380	4	$49,042,000	$53,313,558
2	1.1e+006	102193.3000	6	1	$8,000,000	$8,916,000	4	$7,000,000	$7,801,500
4	3672	341.1398	1	3				$400,000	$416,280
3	2850	264.7736	1	4				$120,000	$130,452
4	3000	278.7090	1	1	$19,000	$62,898	2	$60,000	$198,624
	56000	5202.5680	3	2				$1,960,000	
4	18000	1672.2540	2	1	$75,000	$191,843	2	$75,000	$191,843
6	5600	520.2568	1	1	$201,300	$636,350	3	$49,215	$155,578
5	150000	13935.4500	4	5	$3,000,000	$6,658,500	4	$8,000,000	$17,756,000
4	42000	3901.9260	2	1	$135,000	$446,904	3	$836,058	$2,767,686
3	7200	668.9016	1					$385,000	$392,392
5	22000	2043.8660	2	1	$1	$1	1	$4,000,000	$4,252,000
5	18000	1672.2540	2					$5,900,000	$6,140,130
6	1.2e+006	111483.6000	6	1	$1,500,000	$1,798,950	4	$6,000,000	$7,195,800
5	90000	8361.2700	3	2				$2,700,000	$8,938,080
3	-								
5	100000	9290.3000	3					$3,720,000	$10,504,908
7	251000	23318.6530	4					$4,400,000	$13,909,280
5	220000	20438.6600	4	1	$500,000	$1,411,950	3	$2,300,000	$6,494,970
2	87000	8082.5610	3	1	$120,000	$491,676	3	$1,218,000	$4,990,511
7				3				$30,000,000	$62,385,000
2	5000	464.5150	1					$247,065	$817,884

AGERG	GAREASQ	GAREASM	GAREARG	ACQTYPE	ACQCOST	ACQCOSTA	ACQCRG	DEVCOST	DECOSTA
3	9000	836.1270	1	1	$50,000	$141,195	2	$120,000	$338,868
4	13500	1254.1905	2						
4	190207	17670.8009	4	1	$1	$2	1	$9,000,000	$19,975,500
4	248774	23111.8509	4	1	$500,000	$1,411,950	3	$3,900,000	$11,013,210
4	19500	1811.6085	2	5				$359,922	$920,644
3	107558	9992.4609	3	1	$125,687	$481,771	3	$276,813	$1,061,052
3	70000	6503.2100	3	1	$325,000	$984,003	3	$2,200,000	$6,660,940
3	10000	929.0300	1	1	$55,000	$166,524	2	$63,000	$190,745
4	13320	1237.4680	2	1	$125,000	$130,088	3	$215,000	$223,751
4	3560	330.7347	1	1	$100,000	$366,560	3	$100,000	$366,560
4	7216	670.3880	1	1	$16,250	$41,566	2	$60,136	$153,822
6	12000	1114.8360	2	1	$2,500	$7,903	2	$125,000	$395,150
5	13500	1254.1905	2	1	$8,000	$24,222	2	$375,000	$1,135,388
4	6200	575.9986	1	1	$5,000	$15,806	2	$110,000	$347,732
7	4248	394.6519	1	1	$425,000	$442,298	3	$375,000	$390,263
7	3749	348.2933	1	1	$400,000	$434,840	3	$400,000	$434,840
4	18642	1731.8977	2	3				$1,165,282	$4,625,237
6	33000	3065.7990	2	1	$85,000	$217,422	2	$499,500	$1,277,671
3	-			3				$120,000	$266,340
5				2				$178,000	$424,655
4	60000	5574.1800	3	1	$125,000	$298,213	3	$270,000	$644,139
3	8000	743.2240	1	1	$15,000	$49,656	2	$100,000	$331,040
4	146500	13610.2895	4						
3	3600	334.4508	1	3				$953,000	$3,012,624
5	18300	1700.1249	2	1	$97,500	$232,606	2	$135,000	$322,070
3	60000	5574.1800	3	1	$70,000	$268,317	2	$430,000	$1,648,233
4	60000	5574.1800	3	3				$2,300,000	$2,444,900
3	26819	2491.5656	2	1	$317,900	$1,218,542	3		
7	89000	8268.3670	3	1	$250,000	$596,425	3	$2,000,000	$4,771,400
4	1800	167.2254	1	4				$40,000	$172,308
1	260000	24154.7800	4	1	$4,100,000	$4,457,110	4	$26,500,000	$28,808,150
4	19929	1851.4639	2	1	$72,000	$227,606	2	$600,000	$1,896,720
5	150000	13935.4500	4	1	$825,000	$2,110,268	3	$2,200,000	$5,627,380
3	20000	1858.0600	2	1	$600,000	$611,520	3	$2,100,000	$2,140,320
3	27140	2521.3874	2	1	$150,000	$423,585	3	$448,150	$1,265,531
4	-			2				$76,000	$318,052
3	37200	3455.9916	2	1	$280,000	$667,996	3	$750,000	$1,789,275
3	240000	22296.7200	4	1	$565,000	$1,347,921	3	$3,000,000	$7,157,100
3	21000	1950.9630	2	1	$700,000	$728,490	3	$3,800,000	$3,954,660
4	785262	72953.1956	5	1	$19,000,000	$22,786,700	5	$150,000,000	$179,895,000
5	23000	2136.7690	2	2				$450,000	$1,270,755
4	190000	17651.5700	4	1	$1,200,000	$2,862,840	4	$3,700,000	$8,827,090
6	8100	752.5143	1	1	$290,000	$818,931	2	$25,000	$70,598
4	2.04732e+006	190202.1700	6	2				$30,000,000	$57,732,000
4	235000	21832.2050	4	1	$75,000	$75,000	2	$20,000,000	$20,000,000
5	70000	6503.2100	3	1	$75,000	$76,440	2	$5,000,000	$5,096,000
2	-								
3	10360	962.4751	1	1	$60,000	$229,986	2	$65,000	$249,152
2	436636	40564.7943	4	1	$21,000,000	$22,829,100	5		
3	41000	3809.0230	2	1	$675,000	$702,473	3	$1,800,000	$1,873,260
4	40000	3716.1200	2	1	$1,362,667	$4,510,973	4	$1,000,000	$3,310,400
2	15063	1399.3979	2	1	$75,000	$287,483	2	$315,000	$1,207,427
5	26000	2415.4780	2	1	$69,000	$153,146	2	$400,000	$887,800
5	29400	2731.3482	2	1	$225,000	$536,783	3	$300,000	$715,710
4	3900	362.3217	1	1	$1	$3	1	$55,000	$173,866
5	8000	743.2240	1	1	$90,000	$214,713	2	$220,000	$524,854
6	3000	278.7090	1	1	$60,000	$133,170	2	$55,000	$122,073
7	12000	1114.8360	2	1	$185,000	$473,212	3	$225,000	$575,528
7	6400	594.5792	1	1	$27,500	$70,342	2	$117,500	$300,553
6	1300	120.7739	1					$12,800	$40,463
5	60000	5574.1800	3	1	$560,000	$1,335,992	3	$1,200,000	$2,862,840
4	28797	2675.3277	2	1	$315,000	$751,496	3	$915,535	$2,184,192
3	210000	19509.6300	4	1	$3,100,000	$3,295,300	4	$33,000,000	$35,079,000
4	2e+006	185806.0000	6	1	$12,000,000	$12,000,000	5	$52,500,000	$52,500,000
4	201544	18724.0422	4	1	$2,350,000	$2,554,685	4	$56,150,000	$61,040,665
5	6750	627.0953	1	3				$615,000	$668,567
3	59000	5481.2770	3	1	$617,700	$656,615	3	$7,000,000	$7,441,000
4	77000	7153.5310	3	1	$17,400	$49,136	2	$1,500,000	$4,235,850
7	-			1	$25,000	$79,030	2	$85,000	$268,702
4	18800	1746.5764	2	3				$400,000	$954,280

DECOSTRG	COSTSQ	COSTSQA	COSTSMA	COSTSMRG	COSTSMAC	FINANCE	FINANCCO
4	$33	$122	$1,315	3	$1,315	Public school funds	2
4	$49	$125	$1,342	3	$1,342	City and county funds, private	4
1	$7	$21	$217	1	$253	Local bank	1
2	$23	$80	$865	2	$1,052	Public Funds	2
3	$25	$64	$530	2	$530	In-house	3
4	$37	$94	$1,015	3	$1,015	In-house	3
2	$8	$10	$103	1	$103	Privately financed by tenant	3
4	$110	$120	$1,309	3	$1,309	-	
						Developer equity, commercial bank	6
						-	
						-	
5	$68	$74	$798	2	$1,184	Privately financed	3
5	$67	$77	$840	2	$1,431	Privately financed	3
3	$30	$99	$1,018	3	$1,145	S&L, commercial banks	1
4	$14	$42	$450	1	$450	Insurance company	1
2	$12	$35	$380	1	$587	Securities company	1
6	$56	$237	$2,546	5	$3,182	Insurance company	1
2	$11	$38	$412	1	$412	-	
3	$34	$103	$1,106	3	$1,106	Local commercial bank	1
3	$20	$44	$299	1	$896	S&L	1
4	$50	$50	$538	2	$592	Owner's equity, commercial bank	6
3	$23	$54	$584	2	$730	Purchase financing from previous owner; local	6
						Construction - local commercial bank; perman	1
5	$43	$94	$1,015	3	$1,015	Local banks; funds from ltd. Partnership	6
3	$30	$72	$790	2	$804	Out of town commercial bank, federal grants, l	4
						-	
2	$16	$39	$415	1	$705	Local commercial bank	1
						-	
4	$27	$52	$562	2	$947	Foundation grants, private donations	6
4	$16	$53	$570	2	$570	Construction - local security and trust compan	1
4	$29	$63	$1,049	3	$1,049	Construction - self-financed; permanent - not y	3
						Federal tax credits, CDBG, HOME, and comm	4
2	$22	$67	$400	1	$596	Mortgage company	1
2	$13	$30	$325	1	$325	Fund-raising, private and public grants	4
4	$11	$12	$117	1	$117	State of Georgia	2
6	$120	$139	$1,386	3	$1,494	Private equity; commercial bank construction l	6
5	$44	$45	$482	1	$482	Private equity, commercial bank	6
4	$38	$40	$437	1	$555	CDBG, foundations	2
3	$139	$142	$1,524	4	$1,524	Congressional appropriation	2
4	$68	$76	$817	2	$817	State of Georgia	2
4	$78	$83	$890	2	$890	Publicly funded	2
						Private capital, state funds, rental revenue	4
6	$95	$101	$1,091	3	$1,144	Bonds	1
5	$58	$60	$652	2	$825	Commercial bank	1
2	$14	$36				General revenue sharing	3
2	$20	$82	$882	2	$959	Grants, rentals, tours, memberships	5
2	$19	$80	$858	2	$980	Local commercial bank	1
6	$139	$151	$1,480	3	$1,624	Aetna Life Insurance	1
5	$6	$7	$76	1	$164	Commercial banks	1
2	$109	$113	$1,220	3	$1,220	Public funding	2
2	$42	$46	$493	1	$493	County funding	2
1	$10	$33	$713	2	$938	Local commercial bank	1
4	$35					Undetermined	
1	$4	$11	$115	1	$229	Local bank	1
1	$9	$28	$299	1	$1,522	HUD grant, private and foundation grants	4
5	$40	$89	$1,274	3	$1,752	Federal and state funds for public space; remai	2
3	$22	$73	$709	2	$824	Mortgage company	1
2	$53	$54	$587	2	$587	Various sources of public financing	2
4	$180	$191	$2,080	5	$2,080	State of Maryland, city of Baltimore, commerc	4
5	$328	$341	$3,672	5	$3,672	Bond issue, federal funding	4
5	$5	$6	$65	1	$81	Privately financed	3
4	$30	$99	$1,069	3	$1,069	6 local savings bank	1
						-	
4	$37	$105	$1,131	3	$1,131	Construction - local bank; permanent - insurar	1
4	$18	$55	$596	2	$596	MHFA (state)	2
4	$11	$30	$318	1	$387	MHFA (state)	2
4	$14	$57	$617	2	$678	Savings bank	1
6	$80	$166				Construction - New York commercial bank an	4
2	$50	$166	$1,761	4	$1,761	-	

DECOSTRG	COSTSQ	COSTSQA	COSTSMA	COSTSMRG	COSTSMAC	FINANCE	FINANCCO
2	$13	$38	$405	1	$574	Local commercial bank	1
						-	
5	$45	$100	$1,130	3	$1,130	Fund drive, public grants	5
4	$19	$54	$477	1	$538	Construction - local commercial bank	1
2	$18	$47	$508	2	$508	Federal revenue sharing funds	2
2	$4	$14	$106	1	$154	Public (state)	2
4	$25	$76	$1,024	3	$1,176	Federal funds	2
1	$11	$35	$205	1	$385	Local bank and SBA	2
2	$16	$17	$181	1	$286	Private equity	3
2	$28	$103	$1,108	3	$2,217	In-house	3
1	$8	$21	$229	1	$291	-	
2	$7	$22	$354	1	$362	Savings bank (out of town)	1
2	$28	$84	$905	2	$925	Local banks and SBA; stockholder loans	4
2	$18	$56	$604	2	$631	-	
2	$88	$92	$989	2	$2,110	Commercial bank	1
2	$91	$99	$1,248	3	$2,497	Commercial bank	1
4	$63	$248	$2,671	5	$2,671	City funds	2
2	$15	$39	$417	1	$488	Private donations, public grants	4
2						Community Development Block Grant	5
2						Public (CDA); private investment	4
2	$13	$31	$116	1	$169	6-bank consortium	1
2	$12	$40	$445	1	$512	Local bank	1
						Federal funds (CEO); construction - 2 NYC co	4
3	$135	$427	$9,008	5	$9,008	College funding	2
2	$9	$21	$189	1	$326	-	
2	$7	$27	$296	1	$344	Local savings bank	1
4	$38	$40	$439	1	$439	Private equity	3
					$489	None	
4	$22	$52	$577	2	$649	Local commercial bank	1
1	$22	$96	$1,030	3	$1,030	Private donations	3
6	$102	$111	$1,193	3	$1,377	Developer equity, development bonds	6
3	$30	$95	$1,024	3	$1,147	Local S&L	1
4	$15	$38	$404	1	$555	Local S&L	1
4	$100	$102	$1,152	3	$1,481	Local bank, tenant improvements	1
2	$17	$47	$502	2	$670	Local bank	1
1	$33	$138				In-house	3
3	$20	$48	$518	2	$711	Local commercial bank	1
4	$13	$30	$321	1	$381	Undetermined	
4	$181	$188	$2,027	5	$2,400	Foundation grant	5
6	$191	$229	$2,466	5	$2,778	First mortgage and participating second mortg	1
2	$20	$55	$595	2	$595	In-house	3
4	$40	$95	$500	2	$662	Permanent mortgage with 7 S&Ls, 2 commerci	1
1	$6	$16	$94	1	$1,182	S&L	1
6			$304	1	$304	Private foundations, contributions	5
6	$85	$85	$916	2	$920	Developer equity, commercial bank	6
5	$72	$73	$784	2	$795	Commercial bank, CDBG	4
						-	
1	$10	$38	$259	1	$498	Financed by seller	3
	$48	$52			$563	Seller financing	3
4	$44	$46	$492	1	$676	Developer equity, tax-exempt revenue bonds, S	4
4	$25	$83	$891	2	$2,105	-	
2	$21	$80	$863	2	$1,068	S&L	1
2	$15	$34	$368	1	$431	6-bank consortium	1
2	$10	$24	$262	1	$459	(In process)	
1	$14	$44	$480	1	$480	Private donation	5
2	$26	$63	$706	2	$995	EDA grant (75,000); bank loan	4
1	$18	$41	$438	1	$916	Local S&L	1
2	$19	$48	$516	2	$941	S&Ls, commercial banks	1
2	$18	$47	$505	2	$624	Local bank	1
1	$10	$32	$335	1	$335	Personal loans	3
4	$20	$48	$514	2	$753	Insurance Co.	1
3	$32	$76	$816	2	$1,097	Local S&L	1
6	$157	$167	$1,798	4	$1,967	Tax levy	2
6	$26	$26	$283	1	$347	Private equity, commercial bank	4
6	$290	$315	$3,260	5	$3,396	City funds and bonds	2
3	$91	$99	$1,066	3	$1,066	Owner-financed	3
5	$119	$126	$1,358	3	$1,477	Low-income housing and rehabilitation tax cre	2
4	$19	$55	$592	2	$599	REIT	3
1						Private	3
2	$23	$55	$546	2	$546	Public funds (city and regional)	2

RENTSQ	RENTSQA	RENTSMA	RENTCOD	EXTRESTO	NEWEXT	STRUCTUR	MECHANIC
(not rented)			99	4	3	3	4
(not rented)			99	4	2	3	4
$250 - $500 / mo. / unit			9	4	2	2	4
(not rented)			99	4	2	2	4
-				2	3	2	4
-				3	2	2	4
-				3	2	2	2
Owner-occupied			99	4	4	4	4
Office: $22 psf NNN; retail: $24	$24.52	$263.92	4	4	4	4	4
Owner-occupied			99	3	2	2	4
Owner-occupied			99	4	4	4	4
-				3	3	4	4
-				3	2	4	4
$9.00	$29.79	$320.70	2	2	3	2	4
$7.20	$21.80	$234.65	2	3	3	2	4
$45.00	$136.25	$1,466.55	4	2	2	4	3
$12.00	$51.08	$549.85	3	2		3	3
-				2	3	3	4
-				3	2	4	4
$12.00	$26.63	$286.69	3	2		3	3
Apartments: $550 - $750/month;	$12.00	$129.17	3	3	2	2	4
$37.50 (sale)	$89.46	$962.98	4	4	3	3	4
$5.50 - $8.00	$20.44	$219.98	2	3	2	2	4
$8.46	$18.78	$202.11	2	2	3	3	4
$7.25	$17.30	$186.18	2	4	2	3	4
Office: $12 - $15 psf	$14.05	$151.23	3	4	3	3	4
$5.85	$13.96	$150.22	2	2	2	2	3
-				2	2	2	3
-				1	1	2	4
$9.00 - office; $13.00 - retail	$29.79	$320.70	2	3	4	3	4
-				4	4	3	4
Retail: $60psf; 80 housing units			9	3	4	2	4
$6.00	$18.17	$195.54	2	2		2	4
-				4	2	2	4

Office:Owner-occupied			99	2	1	1	3
-				2	4	4	4
$9 - $10 psf	$9.68	$104.22	2	3	3	3	4
-				3	3	3	4
Owner-occupied			99	4	4	4	4
Owner-occupied			99	4	4	3	4
-				3		2	4
(not rented)			99	3	2	3	4
-				4	4	3	4
Owner-occupied			99	4	4	3	4
-				1	2	3	3
$0.60	$2.46	$26.46	1	2	2	2	4
$2.75	$11.27	$121.28	1	3	2	3	4
Office: $18 psf	$19.57	$210.63	4	4	4	4	4
Office: $8.50 psf; industrial: $2.5	$9.47	$101.97	2	4	4	3	3
Owner-occupied			99	4	4	3	4
$300 / day			9	2	2	2	4
(not rented)			99	3	2	4	4
$10.00			3	3	2	4	4
$3.00	$7.67	$82.60	1	2	2	2	4
-				2	1	3	4
-				4	4	4	4
$7.00	$23.17	$249.43	2	2	2	3	4
Telework offices: $11 psf	$11.21	$120.68	3	2	4	3	4
Owner-occupied			99	4	2	4	4
Owner-occupied			99	4	4	3	4
Industrial: $2 psf			9	3	2	2	4
$9.00	$29.79	$320.70	2	2	2	3	4
-				3	1	2	4
-				3	2	3	4
$4.50	$14.23	$153.12	1	2	2	2	4
$91 - $140 / mo. / low-income			9	3	3	3	4
-				4	3	2	4
$10.00 - $11.00 office	$21.83		3	3	3	3	4
-				2	3	2	4

RENTSQ	RENTSQA	RENTSMA	RENTCOD	EXTRESTO	NEWEXT	STRUCTUR	MECHANIC
$4.80	$13.55	$145.90	1	2	2	2	4
-				4	2	4	4
$5.50 turnkey; $2.00 - $6.00	$12.21	$131.40	2	4	2	3	4
$10.00 - $15.00 commercial	$35.30	$379.95	3	2	2	2	4
(not rented)			99	3	2	2	4
(not rented)			99	3	2	4	4
(not rented)			99	3	3	2	4
(not rented)			99	2			3
Owner-occupied			99	3	2	2	4
(not rented)			99	3	2	2	3
(not rented)			99	2			
$100/mo./studio;$160/mo./duplex			9	4	3	4	4
$5.11	$15.47	$166.53	2	4	3	3	4
(not rented)			99	2			3
Owner-occupied			99	3	3	3	4
Owner-occupied			99	4	3	3	4
(not rented)			99	3	3	4	4
$4.25 commercial and office	$10.87	$117.02	1	4	3	3	4
-				3	2	2	4
(leased by developer)			99	2		3	4
$4.00 - $10.00	$16.70	$179.76	2	3	2	2	4
$3.00	$9.93	$106.90	1	2	2	2	4
$7.50 office; $8.00 - $11.00 retail	$19.18	$206.50	2	3	4	4	4
(not rented)			99	2	3	3	4
-				2	2	2	4
$3.50 - $4.50 office; $145 - $225	$15.33	$165.04	1	2	2	2	4
Office: $9 - $14 psf; retail: $7.50	$12.22	$131.58	2	3	2	2	4
$3.50	$13.42	$144.41	1	2	4	2	1
-				3	2	3	4
-				2	1	1	4
Owner-occupied			99	3	3	2	4
$9.00	$28.45	$306.24	2	4	3	3	4
$12.00 retail; $8.00 office	$20.46	$220.26	2	3	2	2	4
Office: $10 psf; retail: $12 psf; ot	$10.19	$109.71	3	4	4	4	4
$6.00	$16.94	$182.38	2	4	2	2	4
(leased by developer)			99	3	2	4	4
$3.50	$8.35	$89.88	1	3	4	3	4
-				2	2	3	4
Owner-occupied			99	2	3	4	4
-				2	2	4	4
(leased by developer)			99	4	2	2	4
$6.00 - $24.00	$35.79	$385.19	4	2	2	3	4
$5.50	$15.53	$167.18	2	3	3	2	2
-				3	3	2	4
Office: $14 psf, Retail: $15 psf	$14.00	$150.69	3	4	4	4	4
Office:$15 psf, retail:$20 psf	$15.29	$164.56	4	4	3	4	4
-				2	2	2	4
$3.50	$13.42	$144.41	1	2	2	2	4
Owner-occupied			99	4	4	3	4
42 apartments:$395-$1,050/mo.			9	3	2	4	4
(not rented)			99	4	4	4	4
$5.40 or 5 percent	$20.70	$222.80	1		4	4	4
-				4	2	3	4
$4.08 office; $6.00 + % retail	$9.73	$104.77	1	2	2	2	3
-				4		3	4
$6.50 - $7.00	$16.10	$173.34	2	4	3	4	4
$6.50	$14.43	$155.29	2	2	3	2	4
$9.50	$24.30	$261.56	2	3	2	2	4
$5.00	$12.79	$137.67	2	3	3	2	4
(not rented)			99	2	2	3	4
$6.75-$7.00 office,$7.00-$10.00 r	$16.40	$176.55	2	4	2	3	4
$12.50	$29.82	$320.99	3	3	3	3	4
Other uses: $16.50 psf			9	4	4	2	4
Office: $5 psf; retail: $10 psf	$5.00	$53.82	2	3	2	4	4
$35.06 psf	$38.11	$410.25	4	4	4	4	4
Owner-occupied			99	3	4	3	3
Office / retail / gallery: $10 psf	$10.63	$114.42	3	4	2	4	4
-							
-				4	4	4	4
(not rented)			99	2	2	2	4

INTDEM	NEWINT	ENVIRON	LANDSCAP	NEWFAC	SITEREST	FILTER_R	FILTERAO	FILTEROA
4	4		3	3	3	0	1	0
4	4		3	4	3	0	1	0
4	4			2	3	0	1	0
4	4					0	1	0
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INTDEM	NEWINT	ENVIRON	LANDSCAP	NEWFAC	SITEREST	FILTER_R	FILTERAO	FILTEROA
3	3		3	2	2	0	1	0
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	4	4		2	2	0	1	0
						0	0	1
4	4		4	4	4	0	0	1
3	4		2	2	2	1	0	0

VITA

Ms. Isilay Civan was born in Ankara, in 1976. She attended Kadikoy Anatolian High School through 1987 to 1994 and graduated with honors. In 1994, she was accepted to Istanbul Technical University, where she has earned her undergraduate degree in Architecture and Masters degree in Construction Project Management. In the first year of her masters, she was also hired as a teaching and research assistant and started teaching at the same university. After earning her masters degree, she decided to continue her education and enrolled in the doctoral program in construction with the intention of studying facilities management. In her first year, she completed all the required coursework for the program with a 4.0 GPA. In the mean time, she was accepted to a PhD program in Architecture at Texas A&M University with a graduate fellowship in 2001 and started studying on her second PhD with an emphasis on real estate development and management.