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GREEN CAN BRING GREEN: AN EVALUATION AND COMPARISON OF THE ECONOMIC EFFECTS OF SUSTAINABLE AND ECONOMIC REDEVELOPMENT

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of City and Regional Planning

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by
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Accepted by:
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ABSTRACT

The process of redevelopment is a relied upon method of breathing new life into downtowns and urban areas. Though several common redevelopment approaches contribute to a sustainable atmosphere, more significant environmentally- and ecologically- sustainable approaches can be implemented in redevelopments to repair and support the environment and ecology of an area. But do economic and sustainable redevelopment models have similar impacts on the surrounding economies? This report conducted an evaluation and comparison of the economic effects of sustainable redevelopments and economic redevelopments. Though research is considered exploratory, the results demonstrate that sustainable and economic redevelopments are both viable options for redevelopment processes. The sustainable redevelopment framework created from the literature review and from project case studies can inform cities and communities of the different redevelopment approaches and offer a path to sustainability.

DEDICATION

This thesis is dedicated to all of the Youngs, Goodmans, Howells and Currys out there.

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INTRODUCTION

In the late 14th century, England's King Richard II commissioned a new building, College Hall, at Oxford University. The carpenters who built College Hall knew that the massive oak beams spanning the great hall's ceiling would probably need to be replaced in a few hundred years, so next to the building they planted a row of oak seedlings from the trees they used for the beams. Sure enough, the beams needed to be replaced about 300 years later, and the new carpenters had mature oaks right there, ready to be milled and turned into new beams (Smith, 2009). The kind of planning ahead demonstrated in this story is the kind of planning that, historically, went into most major developments and buildings. Times have changed.

With the concepts of rebuilding and redevelopment come concerns with finances and, occasionally, the ecology and environment. Cities and communities naturally grow and change over time; often, these changes in urban areas hurt the living conditions and the desire to be in the area; urban renewal projects take place to improve these built environments (Buntin, 1997). However, many renewal projects place all of their focus on economic redevelopment while falling short of tackling the deeper issues of environmental degradation and carelessness. To minimize the flaws in urban redevelopment projects, a sustainable approach to the redevelopment process is necessary. "The need to grow from within rather than outward provides an impetus to cooperate in new ways. In planning for sustainable redevelopment, communities can construct a framework to provide quality infrastructure and services at the lowest cost; to

give citizens a much greater degree of control over the future of their neighborhoods and communities; and to protect rural lands while enhancing the livability of our cities and towns" (Energy Outreach Center, 1997).

There have been many instances of cities "greening" their urban cores. "Greening" in the sense that cities install LED (light-emitting diods) lights, which consume less energy, bike racks, or other singular sustainable design approaches that do not necessarily work together as a whole system. Though singular approaches are important and a step in a right direction, a renewal project with an environmentally-sustainable concentration will embed the idea of sustainability deeper in the minds of businesses, residents and visitors; having it at the forefront sets a foundation for future improvement.

The purpose of this study is to assess the economic effects of and compile sustainable redevelopment approaches for downtown and community redevelopment. After researching both sustainability and downtown revitalization at length, a slight gap was discovered in the literature and also in methods of sustainable redevelopment. This study is intended to address how the economic effects of sustainable redevelopments compare to the economic effects of economic redevelopments. In answering, an evaluation and comparative analysis of five sustainability-driven versus five economically-driven redevelopment projects have been conducted in order to gain insight into the economic outcomes of the two approaches to redevelopment. A secondary objective of the study is to find what approaches cities use to be more effective in reaching objectives for

sustainability. The second objective is met by the development of a framework of sustainable approaches to downtown and community redevelopment that can be used by cities and towns across the United States. Evaluating the progress of cities that have attempted the implementation of sustainable approaches, learning from their experiences and bringing together different approaches will all allow for a better understanding of the sustainable redevelopment concept.

It is understood and acknowledged that sustainable community redevelopment cannot be put into a strictly defined model or process; yet redevelopment examples nationwide reveal sustainable approaches and demonstrate that steps in the sustainable redevelopment process can help ensure economic and environmental progress in the community.

Several projects were studied as examples of urban redevelopment. These projects demonstrate the viability of redevelopment as an option for increasing community sustainability and effecting economic vitality. “Three key variables affect the vitality of neighborhood retail streets: population in the surrounding neighborhoods, disposable income of the neighborhood residents and the portion of the disposable income that is captured” (Harrington, 2002). These measures, along with other economic indicators are important in determining economic progress. Several economic indicators have been evaluated to discover the impacts of redevelopment on the surrounding economies.

LITERATURE REVIEW

A review of the literature was conducted on the issues of sustainable and economic redevelopment, along with topics closely related. The literature review examines what is known about sustainability, downtowns, redevelopment and different aspects of each such as building and design, marketability and issues and concerns. Forming a foundation of knowledge in the above subjects allows for more accurate analysis and results.

History and Importance of Downtowns

America's urban and downtown areas saw an accelerated decline in the fifties and sixties; the popularity of the automobile changed individual and commercial behavior, and the focus of commercial activity shifted from the cities to the suburbs. During the late sixties and seventies, cities declined further as flight to the suburbs accelerated (Solutions for America, 2003). The result was a vicious cycle in which downtown businesses closed because of population decline, which increased the rate at which residents and visitors left downtown areas (Robertson, 1999).

While downtowns have suffered decline as many competing neighborhood and town centers have grown in the suburbs more recently, hope cannot be lost in downtowns (Ford, 2003). Since the nineteenth century, the creation of new towns, such as garden cities and edge cities, has taken focus off of the downtown. The garden cities proposed by Ebenezer Howard became the models for several suburban communities in London and later in the United States. This concept influenced what is now recognized as "edge

cities." While at the time, this model seemed to improve the quality of life, there is now evidence of its weakness (Ambasz, 2001). The "edge cities" are now considered sprawl and an issue contributing to environmental degradation; residents in sprawl communities rely heavily on automobiles and must use their cars to get to nearly everywhere they need to go, i.e. grocery store, school, work and doctor's office. Along with residential neighborhoods locating on the outside lands of cities, businesses also saw an opportunity with the open land. This flight of businesses and residents to the suburbs left city centers with numerous social and financial problems and the need to breathe new life into the struggling areas of downtowns (Burayidi, 2001).

Redevelopment

In spite of the trends of downtown decline, research shows that a healthy and vibrant downtown boosts the economic health and quality of life in a community. Specifically, it creates jobs, incubates small businesses, reduces sprawl, protects property values, and increases the community's options for goods and services (Solutions for America, 2003). The issues of downtown decline find hope in downtown revitalization. Revitalization is defined as the physical and economic renewal of part of a community as designated by the local government in its comprehensive plan (Palm Beach County, 2007). The term "downtown revitalization" has many aliases throughout the literature; "urban renewal" and "downtown redevelopment" are also used to describe the process.

After the slow decline in downtowns during the early and mid-twentieth century, the nineties saw the evidence and results of downtown revitalization from population increases in urban and downtown areas, particularly among young middle and upper class individuals and families. Crime rates decreased. Commercial investment in small cities was also on the rise (Local Initiatives Support Corporation).

Urban redevelopment can impact several other aspects of a city as well. Portland's Development Commission developed a list of common outcomes of redevelopment based on local renewal projects and case studies; urban redevelopment:

- supports historic preservation
- attracts new businesses & creates jobs
- adds public improvements & enhanced livability
- makes city safer, adds to city's accessibility, protects natural resources
- stimulates private investments
- increases property value
- serves as economic development tool
- raises private investment, increase property value, and creates businesses (Portland Development Commission, 2009).

Redevelopment efforts are as unique as the redeveloping area itself. There is no single, overarching set of guidelines for redevelopment; cities must assess their physical, economic and social assets and needs in order to assure improvement with the

redevelopment (Buntin, 1997). No matter the type of redevelopment, however, there are several approaches that are frequently used, such as renovation of buildings, improvements in the streetscape, and road improvements. Although these approaches are not strictly categorized as environmentally-sustainable, many of them contribute to sustainability in the sense that they increase pedestrian orientation and can reduce vehicle miles traveled.

There are several redevelopment programs that encourage the use of these approaches and offer guidelines for successfully implementing them. Revitalization in urban areas will have sustainable characteristics naturally and because of its inherent sustainable aspects can pave the way for employing more environmentally-sustainable tactics.

One program offering approaches to urban renewal is the Main Street approach or the "National Main Street Program" which is a public-private partnership developed by the National Trust for Historic Preservation. In the 1970s, the National Trust developed its revolutionary Main Street approach to commercial district revitalization, a new methodology that combines historic preservation with economic development to restore prosperity and vitality to downtowns and neighborhood business districts (Gettleson, 1990). Today, this message has spread as the organization advocates a comprehensive approach that communities can use to revitalize their traditional commercial areas through historic preservation and grassroots-based economic development. It has created a network of more than 1,200 active Main Street programs nationally (National Trust,

2008). Projects such as the National Trust for Historic Preservation's Main Street Program and the creation of Downtown Associations have done much to attract investment and reposition the downtown core of tradition main streets. However, much of this work is focused on greenfield or large redevelopment sites rather than existing neighborhoods and commercial districts (Harrington, 2002).

Defining Sustainability and Sustainable Development

Sustainable development is defined in many ways throughout the literature. The contemporary meaning of sustainable development comes from the United Nation's creation in 1983 of the World Commission on Environment and Development which was headed by Gro Harlem Brundtland, the then prime minister of Norway (Edwards, 2005). The most remembered quote from his report defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." It is also defined as development that maintains or enhances economic opportunity and community well-being while protecting and restoring the natural environment upon which people and economies depend (Minnesota, 2008). The implementation of this belief into the urban cores of cities has been slow to catch on. People overwhelmingly dominate the area of a city or metropolitan area and often nature survives as shreds. However for a whole urban region, a nature and people balance is worth considering and evaluating (Forman, 2008).

In the past, little or no concern was given to how urban development might seriously impair the natural infrastructure and its concomitant ecosystem services, such as the ability to absorb pollutants and render them harmless, to cleanse air and water, and to prevent storm and flood damage (Hecht, 2007). Today, we are more aware that urban development can affect energy use, indoor and outdoor air quality, ecosystem quality and services, and natural habitat protection. The construction of roads, roofs, and other impervious surfaces leads to degraded water quality by altering stream flow and watershed hydrology, reducing groundwater recharge, and increasing runoff volume, stream sedimentation, and water acidity: a one-acre parking lot produces almost 16 times as much stormwater runoff as an undeveloped meadow of the same size (Hecht, 2007). Nearly 80 percent of U.S. residents live in urban environments and such areas are continuing to grow. How and where urban development occurs can affect ecosystem quality and services, habitat protection, water resources, energy consumption, and indoor and outdoor air quality (Hecht, 2007).

In any case or analysis of sustainability, it is important to recognize all facets of sustainability. There is a new revolution taking place and it is sustainability. The sustainability revolution evolved as a reaction to the Industrial Revolution's degradation of the environment and people's well-being (Edwards, 2005). The early stages of the revolution of sustainability are linked to a landmark event, the 1972 United Nations Conference on the Human Environment in Stockholm, Sweden. This meeting internationalized the concerns of the American Earth Day (Edwards, 2005). This forum

began to search for links between environmental issues and economic concerns such as employment, development and population growth. Because of this conference many organizations were formed to protect the environment and continue to advocate for sustainable development, along with other environmental and ecological concerns (Edwards, 2005).

In understanding the different facets of sustainability, and especially sustainability in the urban context, one of the key views is that everything is interconnected (Devuyst, 2001). An alternative approach to development that supports economic viability and healthy ecosystems by modifying consumption patterns and implementing a more equitable social framework must be a key emphasis (Edwards, 2005). The mainstream often confuses sustainability with ecological concerns, pitting conservation groups against business interests which create conflicts in downtowns. This situation leads to a deadlock, with polarized viewpoints and inability to compromise (Edwards, 2005). All to say that sustainability has been framed in a narrow perspective, usually associated with a single issue. The anti-globalization, organic foods, green building, renewable energy and other "green" movements all are working within the broader perspective of the sustainability revolution. With sustainability so wide-spread, it is vital that the issues with sustainability be addressed quickly (Edwards, 2005).

Achieving sustainability in an urban ecosystem requires that dozens of stakeholders, including residents, community groups, businesses, realtors, developers, city planners,

city managers, and federal agencies, interact in a coordinated manner. This is clearly not easy, yet linkages among green building design, green engineering, low-impact development, and smart growth are taking root in many communities (Hecht, 2007).

Linking Redevelopment to Sustainability:

In many ways, redevelopment is a sustainable solution in and of itself. Its goal is to revitalize an underutilized area, often providing infill and higher density (National League of Cities, 2008). Community redevelopment can further sustainability by promoting a mix of uses for consolidation of daily activities and a pedestrian-friendly neighborhood (National League of Cities, 2008).

While some principles within community redevelopment frameworks place some amount of emphasis on the environment, a problem still remains with current efforts for revitalization; not enough focus is placed on ecological/environmental sustainability. The overall aim of sustainable urban redevelopment is to achieve a healthy and high quality of life for all people in this and subsequent generations, with equitable and geographically balanced and socially cohesive economic development, which reduces the impact in the global and local environments (Working Group, 2004).

One example of a sustainable urban redevelopment is Dubuque, Iowa, one of the oldest cities in the upper Midwest, which has laid groundwork for the first “truly sustainable” redevelopment of an entire industrial district (Hill, 2009). The project has been cited by

professionals in the historic preservation field as the only large-scale, city-wide and comprehensive approach in the country that is truly using all three elements of sustainable development to apply to the redevelopment of a district. The redevelopment's plan, that included 28 buildings, called for:

- a walkable community
- alternative energy systems, such as solar and wind generation, geo-thermal and centralized heating
- zero-waste production that minimizes discards to the landfill through recycling, reuse programs and composting
- stormwater management techniques such as greenroofs, porous pavements, bio swales, rain gardens and the re-introduction/enhancement of trees
- energy design grants and technical assistance to encourage the development and use of smart-energy solutions
- an energy revolving loan fund to provide low-interest assistance to finance energy-efficient systems
- an energy efficiency zone pilot program and a best practices resource center to share the information with other developers and communities (Hill, 2009).

Broadening the scope in the application of sustainable redevelopment is what sets sustainable redevelopment projects apart from other renewal projects; those applications tend to be centered on the actual buildings rather than a community of sustainable redevelopment (Hill, 2009). There can be numerous opportunities for redevelopment.

Many older, historic communities might not realize what they have; designed before cars were the dominant means of transportation, they are compact, walkable and ultimately sustainable. Historic communities are a tremendous asset. Rather than going out and creating new communities, advantage can be taken of what is already there. This idea extends to cities of any kind who have an urban core in need of revitalization (Hill, 2009).

While the common strategies used in most revitalization approaches are important for revitalization, it seems as though an aspect is taking a backseat to the economic focus. For several reasons the urban core is one of the most challenging areas for dealing with ecological problems (Miller, 2004). Due to its commercial orientation, the ecological health of the downtown is ultimately linked with its economic vitality. As a result, in an economically challenged downtown area, the natural environment does not hold priority in renewal efforts; the challenge becomes designing a renewal strategy that incorporates short term economic gains while working towards long term environmental improvements (Miller, 2004).

Another major challenge for urban renewal involves maintaining a unique identity while attempting to enhance economic vitality. Current trends in project strategies tend to follow a supposed process for "success" that leads to similar features in cities around the world. Some of the main strategies used throughout the past three decades include "pedestrianization," office developments, special activity generators and transportation

enhancement (Miller, 2004). Now that redevelopment strategies have been applied similarly in cities across the country, uniformity of function and appearance blurs the distinctiveness of each downtown. This fact segways to the issue of downtown plans often missing opportunities that will lead to distinctive improved economic viability and sustainability. To meet the principles and goals of sustainable redevelopment, additional elements must be added to the main street focused downtown plan (Biko, 2000).

Protection, restoration and enhancement of the natural environment are essential in re-establishing a community's identity and in bringing people back to its center. Reconnecting an area with its natural environment is a good start in setting the tone for sustainability. Where a natural environmental amenity is not already on site, restoring at least part of the environment through new areas of landscaping and porous surfaces provides a more natural environment that is aesthetically pleasing and beneficial to wildlife, while giving residents the opportunity to experience nature on a daily basis (Buntin, 1997).

"Through reinventing the traditional downtown planning process, residents and local officials of a community can ensure that retail and commercial development accommodates a sustainable land use and helps meet resource conservation goals" (Biko, 2000). Along with setting conservation goals, ensuring that appropriate commercial and retail investment occurs in the downtown rather than on the community fringe promotes sustainable land use (Biko, 2000).

Connecting sustainability to redevelopment can impact many sectors of the downtown. If the project is “green” or energy efficient, it impacts building-related energy demands. If the project is also well-located vis-à-vis the urban context, it can also reduce the energy demand in the transportation sector (Congressional, 2008). It is this dual benefit of sustainable urban redevelopment that holds great potential as a sustainable solution (Congressional, 2008).

Design for Sustainability

Incorporating sustainable design is another benefit in advancing sustainability. Urban design is defined as, first, the physical design and planning of the built environment in relation to the natural environment in and around built-up areas and second, the production of concepts and models that serve the purpose of guiding the sustainable development of settlements (Working Group, 2004). Sustainable development is then explained as having to consider social and economic factors as well as the environment in an integrated and holistic way. “Sustainable development is essentially a concept of resource conservation and development” (Working Group, 2004. Pg. 11).

“While environmental and economic sustainability is the goal, sustainable design is the means we as designers have to contribute to that goal. Sustainable design moves away from extractive and disposable systems that are energy-intensive, resource-inefficient and toxic, toward cyclical, closed-loops systems that are restorative, dynamic and flexible” (Mendler, 2006. pg. 65). The design, construction and operation of buildings contribute

significantly, directly and indirectly, to most of our environmental challenges. Buildings are tremendous consumers of resources and generators of waste. The industrial processes used to manufacture building materials and equipment contributes to waste and pollution as well (Mendler, 2006) and that is why the reuse and redesign of buildings are major approaches toward sustainable redevelopment.

Another term that can be compared to and used with sustainable design is regenerative design. “Regenerative design means replacing the present linear system of throughput flows with cyclical flows at sources, consumption centers and sinks” (Lyle, 1994. pg. 10). Through its own functional processes, regenerative systems provides for continuous replacement of the energy and materials used in its operations (Lyle, 1994). In order for sustainable design to reach its highest potential, regenerative design should be taken into consideration. Sustainable design is said to recognize the interdependence of the built and natural environments (Mendler, 2006). It aims to connect natural energy flows and biological processes, eliminate the reliance of fossil fuels and unsustainable materials, and lastly it seeks to improve resource efficiency (Mendler, 2006). In the short run, the impact of these changes will be to reduce the ecological impact of our designs. In the long run the goal is to create buildings that are not only not harmful but actually part of natural systems and restorative of those systems. Sustainable design is concerned with the quality of our environment as a whole system (Mendler, 2006).

Some examples of sustainable design treating the environment as a whole system include urban reuse, natural ventilation, natural daylighting and climate control, green roofs, solar orientation, and a more integrated approach. Renovating abandoned structures could be the greatest form of recycling (Gordon, 2000). Urban reuse results in far less construction waste than demolition, is usually completed more quickly than new construction, and reduces the need for energy-consuming transportation during construction and beyond. It can also breathe new life into an area by attracting new businesses and entertainment, while preserving the historic character that new construction does not always create. (Gordon, 2000)

Natural ventilation is increasing in popularity as a cost effective way to cool buildings and improve air quality indoors. Properly designed natural ventilation systems can reduce energy consumption a considerable amount. Another example of recognizing sustainability as a whole system is the locating of buildings properly on a site to take advantage of seasonal climates and daylighting. By properly siting a structure and using energy efficient windows, indoor lighting can be increased (Gordon, 2000). Cities are also now rewarding building developers who achieve a Leadership in Energy and Environmental Design (LEED) certification rating. By implementing a rewarding system, the city gives ecologically responsible building owners and developers the chance to increase their rental or sale profits. Lastly, in the past, building construction and design has been a segregated process where all parties involved (land planners, architects, engineers, and so forth) work in seclusion from one another which caused them to not

think of the project in its entirety. There is now a movement toward a more integrated approach in which all parties work together from the beginning to achieve sustainable design at the comprehensive level (Gordon, 2000).

Having impressive features is not enough to contribute to a sustainable community (Thwaites, et al., 2007). Sustainability is not just about repopulating urban areas in economically viable ways but repairing the organism. When a living organism is broken, it can only begin to heal when life has begun to flow again through all its parts and the evolution of the larger system has been ensured (Lyle, 1994). A whole systems approach is the goal of sustainable design so, there must be a starting point and often times the starting point is making the buildings more sustainable.

Building Sustainability

Redevelopment most often involves rehabilitating existing buildings, which takes less energy than new construction (USGBC, 2008). It takes 40 to 65 years for a green, energy-efficient new office building to recover the energy lost in demolishing an existing building and building a new one (Northeast-Midwest, 2008). This finding is based on a calculation of the embodied energy that has been invested in a building over time (the energy needed to extract resource, manufacture building materials and construct a building), as well as the additional energy needed to construct a new green building (Northeast-Midwest, 2008). Many green buildings incorporate energy production features such as solar panels or wind energy. These features not only reduce emission from fossil

fuel-based energy systems, but also create jobs in industry, installation and maintenance throughout the country (Northeast-Midwest, 2008).

The ecological impact of the building design, construction, and operations industry is enormous (Gissen, 2002). Buildings annually consume more than 30 percent of the total energy and more than 60 percent of the electricity used in the United States (USGBC, 2008). In support of the reuse of buildings, the US Green Building Council has a "LEED for Existing Buildings" reference guide that promotes sustainable practices in existing buildings. The rating system addresses exterior building site maintenance programs, water and energy use, ecologically preferred products and practice for cleaning and alterations, sustainable purchasing policies, waste stream management, and ongoing indoor environmental quality. Green building practices can substantially reduce or eliminate negative ecological impacts through high performance, market-leading design, construction, and operations practices. As an added benefit, green operations and management reduce operating costs, enhance building marketability, increase workers' productivity and reduce potential liability resulting from indoor air quality problems (USGBC, 2008).

Along with concerns for indoor air quality, people in buildings can be effectively cut off from nature. Linkages with nature improve human health and recovery from illness, improve mental well being and quality of life, enhance worker satisfaction and productivity and reduce stress (Forman, 2008). The patterns noted above appear to be

associated with biophilia, “the inherent human affinity for nature, whereby people evolved with, fundamentally depend on, and are inspired by nature” (Forman, 2008. pg 76). The idea of being connected to nature has spawned the concept of biophilic design. Buildings not only can minimize adverse environmental and human health effects, as in the LEED design approach in architecture, but buildings and landscapes foster human health, performance and productivity by enhancing connections to the natural environment (Forman, 2008). “Bringing buildings to life” offers significant benefits to nature itself. For example, structures can be designed to enhance surrounding natural systems, serve as stepping stones for species movement across a built area, attract a richness of “fine-scale” nature on the texture of building surfaces and educate people for nature protection (Forman, 2008).

LEED encourages environmentally sensitive building methods including exterior and hardscape management practices that provide a clean, well-maintained and safe building exterior while supporting high-performance building operations (USGBC, 2008). Preserving ecological integrity and enhancing diversity while supporting high performance building operations and integration into surrounding landscape. Another sustainable practice is reduced site disturbance, which means protecting and restoring open space, conserving existing natural site areas and restoring damaged site areas to provide habitat and promote biodiversity (USGBC, 2008).

Issues with Sustainable Design and Redevelopment

The LEED rating system is still a relatively new concept. Why has it taken so long for a process like LEED to be developed? A study of urban cities in England and Wales sought to understand why sustainable development has not been incorporated into mainstream local action. It concluded that the environment and the economy are perceived as a simple dichotomy. In many cases, an "either/or" situation exists because the economy, whose relationship with employment seems more tangible in comparison to abstract ecological concepts, tends to marginalize nature as simply traditional park space. This pigeon-holed perspective of the environment ignores that the economy functions within the limitations of nature (Miller, 2004).

Another reason for hesitation in green building is cost issues. In addressing this matter, a study was performed to evaluate the cost and financial benefits of green buildings. The study was to assess that cost and benefits of green public buildings for the state of California. Thirty-three buildings were studied and assessed in detail the additional cost of each component of the building over that of a conventional building of the same design (Mendler, 2006). It was learned that the average additional cost of "green" was slightly less than two percent; investment in green yielded average life cycle savings of ten times the original investment; the earlier the green was introduced into the design process, the lower the overall cost (Mendler, 2006).

Other reasons sustainable development has had difficulty being implemented is due to a common myth in development that states, when it comes to development, developers and environmentalists are always in conflict. The fact is that the growth versus environment debate is not an either/or proposition. Developers and environmentalists can and do work together to accommodate both (Urban Land Institute, 2002). Developers have discovered that environmentally sensitive practices and features can enhance the value of projects, sometimes reduce construction costs, reduce operating costs, and improve project marketability; environmentalists have discovered that working with developers can help them protect natural resources (Urban Land Institute, 2002).

There have been few examples of entire communities being built or rebuilt on a green theme (Mozinski, 2008). This is most likely due to the popular belief that sustainability is too expensive to incorporate into development, when in actuality the costs of regular development and sustainable development fall into the same price range for construction (Mendler, 2006). Sometimes overlooked is the fact that sustainable development makes economic sense (Mendler, 2006).

Economics and Marketability of Sustainable Redevelopment:

Urban environmental problems have real economic costs that are usually linked to lowered productivity, congestion and increased health care needs. The most commonly used economic valuation techniques for the urban environment are loss in earnings, actual defensive or preventive expenditures, replacement costs, hedonic pricing, travel

costs, and contingent valuation (Leitmann, 1999). To resolve the negative economic costs, ecological economics incorporates both the environment and the economy. In ecological economics, people understand, adapt and plan both long and short term for the broader natural and human system of which they are a part (Forman, 2008). The concepts of sustainable design and development fit into the parameters of ecological economics. However, often times, sustainable development is misrepresented.

There are several myths about sustainable development. Answering and explaining these myths are essential in executing downtown redevelopment. Many businesses are now concerned with promoting themselves as ecologically-friendly and therefore are also drawn to a project's green aspects, particularly the effort to cut greenhouse gas emissions (Mozinski, 2008). Major corporations and companies are involved with green building as well; the cost difference in green and conventional building is slim to none. Making "sustainable" choices in the design, building or renovation phases and then enjoying the benefits, such as lower utility bills (Melaver, 2008), is good motivation for businesses to commit to sustainability. There are many benefits to green buildings besides lower operating costs. Green buildings are recognized as better investments than non-green buildings; two recent studies show that green certified buildings outperform peers in occupancy rates, sale price and rental rates. Green buildings can add up to sufficient ecological changes, since energy use by buildings makes up more than a third of the energy consumed in the U.S. (Melaver, 2008)

A common myth in the building industry and in society is that green buildings cost more. Study after study has shown a slim to non-existent cost premium for building high performance green buildings (Melaver, 2008). While most studies refer to these green buildings with the LEED certification system, the U.S. Green Building Council has also prepared a LEED for Existing Buildings manual. The manual provides the same components as LEED for new construction but modifies accordingly to existing structures in order for these buildings to acquire certification. A study found that when comparing the cost of buildings seeking LEED certification against conventional buildings, the analysis concluded that the cost per square foot for buildings seeking LEED certification fell into the existing range of costs or buildings of similar program type. (Melaver, 2008) Also, not only do "green" buildings cost pretty much the same as conventional buildings, but they cost less to operate, often result in greater occupant productivity and are increasingly better investments than their traditionally built counterparts (Melaver, 2008). In keeping with the indirect focus of improving the economy through ecologically sustainable approaches, investment in buildings is an important topic to mention. Green buildings deliver 3.5 percent higher occupancy rates, 3 percent higher rental rates, a 7.5 percent average increase in building values and a 6.6 percent higher return on investment (Melaver, 2008).

There has been a tremendous surge of interest in sustainable design for many reasons (Mendler, 2006). "The primary reason is based on concern about the environmental challenges that we face and a desire to address them in the design of the built

environment" (Mendler, 2006). Simply put, it is the right thing to do. Additionally, it is increasingly clear that sustainable design improves the performance of buildings and increases user satisfaction and productivity. Often, it is not understood that it makes sense economically (Mendler, 2006). Sustainable design does not have to cost more and may actually cost less. Using the design guidance and checklists and using LEED as a metric, design teams can identify opportunities for improved building performance and reduced environmental impacts that are cost-neutral. It is just a matter of developing an increased awareness of sustainable design issues and opportunities (Mendler, 2006).

A lot can be done within traditional first cost constraints. Integrated design solutions allow for cost shifting within a conventional budget (Mendler, 2006). For example, increased expenditures on the building envelope and improved lighting can lead to reductions in the size and the cost of mechanical systems (Mendler, 2006). It is these types of considerations that are important in assessing the life cycle cost of development. While an economically efficient project is likely to have a cost effective building, it is impossible to summarize cost-effectiveness by a single parameter. Determining true cost-effectiveness requires a life-cycle perspective where all costs and benefits of a given project are evaluated and compared over its economic life (NIBS, 2009). The challenge is often how to determine the true costs and the true benefits of alternative decisions. For example, what is the economic value in electric lighting savings and productivity increases of providing daylight to workplace environments? Or, what is the value of

saving historic structures? Alternately, what is the cost of a building integrated photovoltaic system, given that it may replace a conventional roof? (NIBS, 2009).

In looking at the concept of life-cycle economics, cost shifting can occur in development that allows for more sustainable approaches. It is not necessary to spend more to create a green building, a shift to life cycle economics expands the opportunities for improving building performance (Mendler, 2006). Life cycle economics takes into account the total cost involved from start to finish; raw material acquisition, manufacturing, use and disuse. By considering first cost together with operating and maintenance costs, periodic replacement and residual value, there are sustainable options that make sense over the long term. The long term owners of buildings clearly have an interest in life cycle economics. Builders can also benefit from increased life cycle value, provided the added value can be measured and translated into increased market value (Mendler, 2006).

Along with building quality, a determinant of a city's appeal to real estate investors, that is coming more to the forefront, is the quality of life (van den Berg, 1999). The economic potential of a city appears to depend increasingly on the quality of the living environment. Sustainable communities have been shown to increase the quality of life in a city (van den Berg, 1999). A city's ability to attract business investment often depends on the quality of a variety of aspects; a sustainable city is one of these aspects.

It is important to address the relationship between population growth and economic growth in growing cities. Fluctuations and adjustments in wages, prices, markets, credit, interest rates, employment, technological change, international trade and other variables affect growth rates and thus are important in economic models (Leitmann, 1999). There are many ways to classify economic development strategies. Some indirect business development strategies include infrastructure improvements and planning and redevelopment studies (APA, 2008).

One of the business development strategies, redevelopment, can be moderately expensive, or it can be very expensive, at least up front and it often requires public investment in the form of funding to provide sustainable design (Buntin, 1997). Though expensive, redevelopment is commonly less costly than new development, especially when buildings are reused; redevelopment projects are not always feasible if all new construction is required (Buntin, 1997). Sustainable redevelopment long-term costs are considerably less than with typical sprawl development. The city can regain large blocks of funding shortly after infrastructure improvement and site preparation by selling parcels to developers; and as development continues, so will the direct economic return on investment (Buntin, 1997).

The economics of sustainability is important to address and recognize as another facet of the complete understanding of sustainability. Along with economics comes another issue

that garners the components of sustainability, ecology. In a successful redevelopment, the economics and ecology must both be addressed.

There are several significant economic data that is not readily available at the level of study set in this report. Land, property and market values along with crime rates are just a few of the economic indicators where information could not be obtained for each project. According to Portland, Oregon's Urban Renewal Performance Measures, urban renewal has the following effects on the economies around redevelopment projects:

- Improvement to land values increase above the city average
- Assessed real market value per acre in renewal projects is at least 3 times greater than when the projects were created
- Increases in tax assessed real market values within each urban renewal area have outpaced citywide growth
- Since 1990, crime has been reduced in the urban renewal areas anywhere from 24.5% to 67.8% compared to citywide reduction of 15.9%.
- In the past five years alone, urban renewal efforts have helped create or retain more than 10,000 jobs and have helped create or rehabilitate more than 7,700 single and multi-family homes
- Two-thirds of all residents favor the concept of urban renewal (Portland Development Commission, 2009).

Sustainability's Ecological Influence

Though there are various takes, interpretations and implications, the understanding of the derivation is practically similar across the board. The concept of sustainability has its origin in ecological science. It was developed to express the conditions that must be present for the ecosystems to sustain themselves in a long-term perspective (Devuyst, 2000). In the World Commission report, there are several strong references to the necessity of ecological sustainability; this implies a requirement of sustaining biological diversity. Biological diversity must be maintained as a necessary but not sufficient condition for sustainable development. Further verification of this is found in the Rio Convention on biological diversity. According to the convention, biological diversity is defined as the variability among living organisms, at the species level as well as at the ecosystem level (Devuyst, 2001).

Traditionally, environmental policies, programs, laws and decisions have focused on reducing risks that harm natural resources; that is environmental protection (Devuyst, 2001). A number of initiatives that deal with the disposal of waste: hazardous waste cleanup, solid waste, wastewater and medical waste. A sustainable development perspective shifts the emphasis from risks to the health of the natural ecosystems (Devuyst, 2001). "Environmental impacts are not limited to a project site or to a confined pond or discharge point. Rather, the entire ecological system is of concern, and the challenge is to understand how a particular development not only impacts natural

resources on-site, but also how those interconnected land, water and air resources are affected." (Devuyst, 2001)

Human beings have long used ecological principles to design their habitats. The Greeks initiated passive solar architecture, the Romans used thermal mass to regulate temperature and the desert cultures of the Middle East built structures that achieved natural ventilation and cooling. (Porter, Cahill, Sauer, 2000) Eventually site and building designs started to depend on technological means to augment or even replace reliance on natural processes. In these circumstances, living and working places lost connection with the surrounding natural environment and even isolated their occupants from nature. (Porter, et al., 2000)

The basic goal of sustainable development in the realm of the environment is to use development to restore, preserve, conserve and enhance the ability of natural systems to function for the benefit and enjoyment of humans, animals, wildlife, marine life, and other living creatures now and in the future. Development can be an opportunity for community improvement rather than dealt with as a source of ecological problems. A community whose development enhances, rather than undermines, ecological integrity is "in harmony with natural systems by reducing and converting waste into non-harmful and beneficial purposes and by utilizing the natural ability of environmental resources for human needs without undermining their ability to function over time." (Devuyst, 2001)

In an analysis of a section of the street, one begins to recognize the intricate range of ecological impacts that exist within the downtown. Some of the ecological problems associated with the vehicular street include carbon dioxide vehicular emissions, lack of bicycle lanes, and runoff of salt, oil and gasoline into the water system. For the pedestrian realm, lack of recycling facilities, trees and permeable surfaces all cause problems for the downtown area. Finally buildings produce energy inefficiencies and excessive throughputs to infrastructure such as waste and water. (Miller, 2004) Ecological sound utilization of natural resources implies a fundamental change in the way we do business. It means more than pollution prevention, reduction, and reuse. “It implies a complete understanding of how ecosystems function, an ability to set thresholds for their long-term health and a philosophy of development that seeks to utilize natural resources in ways that keep pace with their productivity” (Devuyst, 2001. Pg. 281).

For some larger scale construction/development projects, city managers require contractors to recycle the construction debris. In the case of Robert Fox, Bruce Fowle and William Browning, collaborating with two of the most important recent green projects (the Conde’ Nast building a Four Times Square and the Battery Park City Environmental Guidelines), debris recycling was required. They stated that the contractors fought them because it was a lot of work, but then they realized that they could salvage the debris and make money. They estimated that about 70 percent of the construction material was salvaged (Gissen, 2002). This approach not only saved them money but also saved on energy consumption.

While the true meaning of sustainability is still not fully comprehended, it is important to reiterate that the ecological aspect of sustainability will not exclusively solve our unsustainable redevelopment problems. It is not a "silver bullet" (Yoko, 2008). Achieving a sustainable outcome demands a higher level of communication and integration among all the various stakeholders than is typically implemented today. Sustainability demands that other professionals involved in the project, from planning, financing, regulating, designing, constructing, marketing, and the eventual owner and maintainer become involved in the understanding, implementation and long-term impacts of these new concepts. (Yoko, 2008)

Issues and concerns with Sustainable Redevelopment

While sustainability can be the glue that brings together city officials, business leaders, school officials, and nonprofit organizations, politics can become the wedge that splits them apart (Thompson, 2009). Traditional hierarchal organization models that are familiar to city governments and businesses are often at odds with the less conventional governance models necessary to create the required partnership within the community. Creating partnerships is a critical element of any sustainability initiative's success and requires the participation and cooperation of many different sectors within the city (Thompson, 2009). Several cities are tackling sustainability and while it may be too soon to tell whether cities have been successful in becoming sustainable, it is not too early to assess how seriously they are addressing the problem (Thompson, 2009).

In measuring sustainability and dealing with sustainability indicators, a well-constructed set of indicators must include a definition of the indicator and how it is measured, why it is important and the target level for the metric (Thompson, 2009). A common temptation cities face is to develop a long list of indicators that represent the interest of everyone in the community; the challenge is to find the short list of indicators that are critical to the success of the sustainability initiative, and focusing on them (Mozinski, 2008). The way in which sustainability initiatives are organized varies from city to city and one size does not fit all (Thompson, 2009). This also is true of success in redevelopment; there is no fixed formula for redevelopment. Each community's redevelopment effort must be as unique as the community itself. It must rest squarely on the backs of city leadership and staff; it must involve the communityl it must forge relationships with developers who may fight against properties of sustainable redevelopment; it must step carefully through a maze of political processes and financial mechanisms; and it must be painfully patient yet delicately persistent (Buntin, 1997).

Indicators for Sustainable Development/Redevelopment

The purpose of sustainability indicators is both to measure important features of sustainable development and to act as a catalyst in promoting the same sustainable development. A survey of the international literature on the topic of environment and sustainability indicators shows, however, that the greater part of the literature is

concerned with the design of indicator systems and, to a lesser extent, with experiences in putting them to practical use (Devuyst, 2001).

A set of urban sustainable development indicators can not only guide site-specific development decisions but can also be used as a planning and policy tool to guide development as a whole (Devuyst, 2001). The term “sustainability indicators” runs the risk of misunderstanding because each of those words mean different things to different groups of people involved in a sustainability movement. Indicators are usually generalizations of the phenomena which they seek to measure, since many of the phenomena are complex and often not completely understood (Miller, 2004).

While indicators for sustainable downtown redevelopments will need to be modified to the various issues specifically involved, the basic test for the appropriateness of specific indicators is that they make sense to the affected people. Because circumstances vary person to person and place to place, the development and identification of indicators need to be tailored carefully to resonate with people in language that they understand, focused on issues that have significant meaning, and can be applied in ways that help produce substantial improvements in their lives. (Devuyst, 2001)

Other indicators used to measure sustainability have been dubbed “bean counters” meaning that they measure items such as the number of dollars spent, number of open space acres purchased, and number of environmental permits issued (Devuyst, 2001).

Although these figures indicate a commitment to and investment in resources (funds, personnel, time), they do not adequately evaluate how successful they translate into tangible improvements. Community outcome measures, on the other hand, consider how these process and program improvements affect the well being of people and health of natural resources" (Devuyst, 2001. Pg. 283).

It does seem that many of the sustainability indicators measure a lack of something, or a discrepancy. By framing the indicator to measure positive change rather than a deficit, emphasis is shifted toward improvement rather than an accounting of what is not desired (Devuyst, 2001). History of a built environment cannot be completely changed nor erased; finding ways to deal with this issue and still creating a desirable place is an aspect of sustainable redevelopment (Brand, 1994).

How can sustainability be measured? There are several approaches mentioned for sustainability and planning. Ecological footprint analysis assesses the prospects for urban sustainability and the conditions necessary to achieve it. Further indicators for environmental sustainability include, tons of waste land filled annually, water usage, air quality, use of public transportation, number of energy efficient buildings, carbon footprint per capita and urban tree canopy (Biko, 2000).

Though measuring the impact or "success" of sustainability approaches is important, the actual implementation of the approach is significant itself. To try and give sustainable

methods and approaches an exact value and weight would be premature. An informative list of sustainable initiatives can be just enough to get a city or town started out on a path toward a sustainable community (Victorian, 2005).

METHODOLOGY

Redevelopment projects are one of the common and relied upon ways to revitalize a downtown or urban area. The two models of redevelopment discussed and evaluated in this thesis include sustainable and economic. In assessing the two different models, the main objective is to evaluate and compare the economic outcomes of sustainable redevelopments and economic redevelopments. The research conducted for this thesis that supports the analysis exploratory. To make a claim that redevelopment is the sole reason for the economic results would be misleading; external factors within the city may affect the redevelopment project study area.

The economic analysis is set up with ten redevelopment projects; five of which are sustainably redeveloped and five of which are economically redeveloped. Sustainably redeveloped projects were categorized as sustainable by evaluation of the approaches used; incorporation the four “top” sustainable approaches (renewable energy source, energy efficiency in buildings, the use of local materials, and recycled materials used in construction) are what make the five sustainable projects stand out among redevelopment projects, along with the. The five sustainable projects studied and analyzed have also been categorized as sustainable redevelopments according to their project goals and

missions which state the main emphasis being environmental/ecological commitments in development and redevelopment. The list of specific “green” approaches utilized by the projects can be found within the Sustainable Redevelopment Framework created by this thesis. The five economic projects have been categorized as economic as their mission and vision state their focus as economic improvement and development. The economic redevelopments have each used a majority of effective, yet common, redevelopment approaches, which are listed after the Sustainable Redevelopment Framework.

The majority of the projects in the analysis were found using resources and online libraries at well-known organization and company websites such as the Smart Growth Network, Terrain.org (an online journal of the built & natural environments), Duany Plater-Zyberk & Company, and the Environmental Protection Agency website. Using projects referenced on these sites authenticate the processes, outcomes and aspects of each project. Each project contains the same types of development and uses; retail and commercial, residential, office space, and open space all had to be present in the redevelopment projects in order to be included in the analysis.

The group of projects is a sample of the population of redevelopment projects and the results obtained from the sample are assumed to be characteristic or typical of the whole population. This sample is representative of the population due to the fact that the projects span in location across the United States, range in income levels, and in population levels. The projects do vary in size which is important in understanding the

impact of the project on the surrounding economy; a larger project will have a greater impact on the area. This was understood during the analysis and is explained further in the discussion of the results.

As research to find sustainable redevelopments commenced, it became difficult to categorize the various redevelopments into an identical group for analysis. Criteria for inclusion in the analysis included year of project start and year of project completion, the types of development included in the redevelopment and the reason for redevelopment.

The 10 redevelopment projects were selected and examined for comparison of economic indicators. These economic indicators were taken from an analytical, mapping and reporting tool "Local Employment Dynamics (LED) OnTheMap." This is an online tool through the Census Bureau that uses American Community Survey data to show employment and residential information as well as demographic information of a selected area. Because OnTheMap currently only has available data for 2002-2006, redevelopment projects were specifically selected that began and ended during these years.

Process of Analysis

Using the OnTheMap tool, a half-mile ring/buffer was created around each project's development. Subsequently, the block groups most incorporated in the buffer were selected for analysis. Block groups were used, rather than solely the half-mile radius, due

to the fact that further demographic data is available by block group. This is important because if additional research is desired to observe trends in the project areas, the information is obtainable. Because of the differences in size of block groups, the actual study area sizes range from 1.6 square miles to 2.7 square miles. Larger study areas are a result of larger block groups which means less population per square mile; the smaller study areas contain smaller block groups which means more population per square mile; the size of the block groups balances out in number of residents in the study areas.

The economic indicators were selected based on the data available from the OnTheMap tool. While several economic categories and data are available, nine indicators were selected based on the knowledge and understanding obtained from the literature review and previous education in economics and quantitative analysis. The nine categories are:

- total jobs
- jobs age 31 and older
- jobs age 30 and younger
- over $40,800 annual earnings
- under $40,800 annual earnings
- private sector number of employers
- private sector number of new hires
- private sector average monthly earnings, and;
- number of employed residents

The analysis of the 10 redevelopment projects is set up to easily compare the economic changes between projects, indicators and years. With this information, conclusions can be drawn that explain the trends, differences and characteristics of the redevelopment projects. It is hoped that from these redevelopment projects a firmer understanding of the redevelopment and sustainable redevelopment concept will be obtained.

PROJECT DESCRIPTION

The project description section provides more detail about each redevelopment project studied including types of uses in developments, the reason for renewal and the story behind the project. Also included are a list of the sustainable/“green” approaches used and a list of the standard redevelopment approaches used. Each project presents information in the same way and in an identical, simple layout.

An analysis is also provided of each project’s economic changes during and after construction of the project. In looking at the nine economic indicators (total jobs, jobs age 31 and older, jobs age 30 and younger, jobs earning over $40,800, jobs earning under $40,800, number of private sector employers, number of private sector new hires, amount of private sector monthly earnings, and number of employed residents), conclusions can be drawn about the projects’ economic progress. This is important in effectively comparing the sustainable projects to the economic projects.

Additional research was conducted in order to uncover any outside economic activity that could have an influence on the economic activity within the study areas. Having an outside influence does not make the study of the economic outcomes void; instead it offers a recommendation to municipalities or companies to not always expect immediate economic improvement due to external factors, for example, a new company locating its headquarters nearby or having another redevelopment project open right before another.

It must also be explained that the cases presented are all broad brush in the sense that the outcomes discussed for each cannot be fully contributed solely to the redevelopment. Several external factors can have a hand in the economic changes of the study area.

Brewery Blocks

Category: Sustainable Redevelopment
City, State: Portland, OR
Population: 2,207,462
Metropolitan Statistical Area (MSA):
Portland-Vancouver-Beaverton, OR
Year of project start: 2003
Year project complete: 2005
Project Size: 5 blocks
Median Income of city ('05-'07): $45,512
Mean Income of city ('05-'07): $63,114
Types of development/uses:
Retail/commercial, Residential, Office, Open space
Community
Reason for renewal: Loss of jobs, brewery shut down in 1999
Description: The Brewery Blocks covers five blocks on the southern edge of Portland's Pearl District, a former warehouse and light industrial area north of downtown. The project is located on the former site of the Blitz-Weinhard Brewery which opened in 1856. The brewery was open until 1999. Brewery Blocks ties a cluster of residential and commercial spaces to the streetcar line, and has created a bridge between the city's central business district and the Pearl District. This redevelopment added to the district's momentum bringing 1.7 million square feet of mixed-use development, including

renovated office space, high-end retail destinations and luxury apartments and condominiums (Brewery Blocks, 2009).

Green approaches:
Renewable energy source
Energy efficiency in buildings
Indoor Air Quality Improvements
Local Materials
Alternate transportation
Other natural preservation/open space
Bike Racks
Open community
Sustainable Design
Historic preservation
Minimize site disturbance
Reduced impervious surfaces
"Green" wastewater
Light pollution reduction
Daylighting
Energy efficient windows
Low flow plumbing

Redevelopment approaches:
"Smart" location
Reduced auto dependence
Housing/jobs proximity
Compact development/higher density
Walkable streets/pedestrian orientated
Building reuse/adaptive reuse
Retail at street level
Office/Residential above retail
Streetscaping
Street furniture
Façade improvements
Incentives for redevelopment and infill
Mixed use development

The commencement of project construction for Portland's Brewery Blocks took place in 2003. In 2003, the study area had almost 18 percent less new hires in the private sector than in 2002 and between 2003 and 2004 the study area saw almost no change. At first glance this difference may raise questions but as construction and renovation of the project began, there were naturally less companies locating in the area and therefore, less new hires. One of Portland's largest employers is the Intel Corporation and in 2004, Intel announced they would be hiring over 300 new employees at their Hillsboro location (City Data, 2009), which is just 12 miles outside of the downtown Portland area. With the Brewery Blocks study area having 4.4 percent of its employed residents working in Hillsboro in 2004, there is a chance that Intel could be the reason for such a low number of new hires within the study area in 2003 and 2004.

Nearing completion of the project, the Brewery Blocks saw a significant change in employed residents. Between 2005 and 2006, the study area had an increase of over 1,000 employed residents, a 35 percent increase. The Brewery Blocks redevelopment also saw an increase in jobs earning over $40,800 and a decrease in number of jobs earning less than $40,800. With the increases in the economic indicators, the Brewery Blocks saw an average overall change of over eight percent upon completion.

The surrounding urban fabric of the Brewery Blocks is heavily commercial, office and light industrial. There are several residential complexes, but being in the heart of a downtown, this project has a very business-oriented atmosphere around it.

Second Street District

Category: Sustainable Redevelopment
City, State: Austin, TX
Population: 1,652,602
Metropolitan Statistical Area (MSA): Austin-Round Rock, TX
Year of project start: 2002
Year project complete: 2005 (phase II)
Project Size: 7 blocks
Median Income of city ('05-'07): $48,227
Mean Income of city ('05-'07): $68,799
Types of development/uses:
Retail/Commercial, Residential, Office, Open Space
Community, Industrial, Hotel
Reason for renewal: Urban decay, enhance image, lack of pedestrian focus
Description: Austin's Second Street District is a six-block infill and redevelopment project located north of Town Lake and along the south edge of downtown Austin, TX. The development has a vision to enhance the identity and image of downtown Austin while providing a "pedestrian-dominant" spine that will connect City Hall to the Convention Center complex. The redevelopment incorporates mixed-use (primarily street-level retail), upper-level office space and residential. This redevelopment plan also includes streetscape improvements that closely follow Austin's sustainability principles.

Green approaches:
Renewable energy source
Energy efficiency in buildings
Indoor Air Quality Improvements
Green Roof
Recycled materials [in construction]
Local Materials
Pervious pavement
Alternate transportation
Other natural preservation/open space
Bike Racks
"Green" stormwater mgmt.
Native Landscaping
Wetland/water body conservation
Open community
Sustainable Design
Minimize site disturbance
Reduced impervious surfaces
"Green" wastewater management
Heat island reduction

Redevelopment approaches:
"Smart" location
Reduced auto dependence
Housing/jobs proximity
Compact development/higher density
Walkable streets/pedestrian orientated
Building reuse/adaptive reuse
Retail at street level
Office/Residential above retail
Streetscaping
Street furniture
Façade improvements
Road Improvements
Business improvement districts
Incentives for redevelopment and infill
Mixed Use development
Signage creation/improvement
(Terrain.org, 2009).

A major change in Second Street District's employment occurred between 2004 and 2005. During this time, major software, medical and electronic companies established or expanded their headquarters in Austin (City Data, 2009). These companies' headquarters are located outside of the Second Street's study area and may be one of the main reasons for the decline of jobs in the study area. The decline in jobs has an overall affect on the other economic indicators used in this analysis. This time frame , 2004-2005, was also during the stage of construction of the redevelopment project. Between 2005 and 2006, once a major phase of the project (phase two) was completed, the number of jobs within the study area increased by over 20 percent. With the increase came an increase in

number of workers over the age of 31, an increase in all annual earnings, and an increase in number of private sector employers and new hires.

As current research suggests, companies are picking up on the sustainable movement. Companies are attracted to being apart of a more sustainable lifestyle. The increase in the majority of economic indicators for Austin's Second Street District implies that the green redevelopment approach worked in the city's favor. As mentioned in the project write-up section the Second Street's project contains energy efficiency in its buildings; specific approaches include recycled construction materials, reuse of air-conditioning condensation water, interior materials (paints, carpets adhesives) have low to no volatile organic compounds for increase in indoor air quality, and bicycle storage, showers and lockers to encourage use of alternative transportation. As far as renewable energy source use goes, the project utilizes photovoltaic cells for a portion of buildings' daily electricity (Terrain.org, 2009). Such sustainable approaches are attractive to companies; daylight, views to the exterior, personal temperature and lighting controls, fresh air, and improved indoor air quality are almost universally requested by users regardless of building type, size, or location. When given these things, users, in this case, employees and employers, universally respond positively. The connection between sustainable building design, user satisfaction, and increases in productivity seems to be a logical conclusion (Mendler, 2006).

The surrounding urban fabric of Second Street District is heavily office and commercial. Similar to Portland's Brewery Block, the atmosphere is quite business-oriented which can be beneficial to a mixed-use redevelopment project. The employees and residents in the surrounding areas can walk to or easily visit the area to eat, shop or relax.

Glenwood Park

Category: Sustainable Redevelopment
City, State: Atlanta, GA
Population: 5,376,285
Metropolitan Statistical Area (MSA): Atlanta-Sandy Springs-Marietta, GA
Year of Project start: 2003
Year of Project end: 2005
Project Size: 7 blocks
Median Income of city ('05-'07): $44,163
Mean Income of city ('05-'07): $79,259
Types of Development:
Retail/Commercial, Residential, Office, Open Space
Reason for renewal: urban decay, loss of jobs
Description: Glenwood Park is a 28-acre neighborhood in Atlanta, two miles from the center of downtown. It is located on a former industrial site that had most recently been used as a concrete recycling facility. The community is noted for its commitment to traditional neighborhood design, walkability, mixture of residential and commercial uses and environmental management practices (Terrain.org, 2009).

Green Approaches:
Renewable energy source
Energy efficiency in buildings
Indoor Air Quality Improvements
Green Roof
Recycled materials [in construction]
Pervious pavement
Alternate transportation
Other natural preservation/open space
Bike Racks
"Green" stormwater management
Native Landscaping
Wetland/water body conservation
Historic preservation
Live/Work
Floodplain avoidance

Redevelopment approaches:
"Smart" location
Reduced auto dependence
Housing/jobs proximity
Compact development/higher density
Walkable streets/pedestrian orientated
Building reuse/adaptive reuse
Retail at street level
Office/Residential above retail
Streetscaping
Street furniture
Façade improvements
Road Improvements
Town Center creation/improvement
Mixed Use development
Signage creation/improvement

The Glenwood Park project is located just outside one of the largest and fastest growing metropolitan areas in the country, Atlanta, Georgia. It was questioned whether the project should be thrown out due to the effects of such a large urban surrounding; however, the decision was made to keep the project in order to show how valuable a sustainable redevelopment can be in such a large city. The largest economic change throughout all redevelopment projects occurred with the Glenwood Park project. Once the project was completed in 2005, the number of private sector new hires went up from four to 233, a 568 percent increase. With a medium sized mixed-use town center in the development, such an increase in the private sector may be attributed to something else. Research was conducted in hopes of finding the reason for such an increase, however, no conclusive information was discovered. It is possible that a company established its headquarters or a new office a mile or so outside of the study area. A new location can affect the increase in job activity within the private sector (City Data, 2009).

Surrounding the Glenwood Park community are schools, light commercial and several mature residential neighborhoods. It is stated in the redevelopment plan that the neighborhoods felt underserved in the retail/commercial department before Glenwood Park and now value what Glenwood Park has to offer. Having schools and light commercial nearby provides the project with an already present population of patrons to the area.

Belmar

Category: Sustainable Redevelopment
City, State: Lakewood, CO
Population: 140,590
Year of Project start: 2003
Year of Project end: 2005
Project Size: 22 blocks
Median Income of city ('05-'07): $51,333
Mean Income of city ('05-'07): $64,874
Types of Development: Retail/Commercial, Residential, Office, Open Space, Community (Belmar, 2009).
Reason for renewal: regional mall closing
Description: Facing the decline of its area mall, Lakewood, CO set out to transform the site into a real, walkable downtown. Using a few parts of the old mall, Belmar turned the site into a traditional grid of narrow streets and small blocks. These new, pedestrian-friendly blocks have one-million square feet of shops, restaurants, and other services. The redevelopment also includes new homes, townhouses, live/work units, office space and nine acres of parks and plazas (The Town Paper, 2005).

Green approaches:
Renewable energy source
Energy efficiency in buildings
Indoor Air Quality Improvements
Recycled materials [in construction]
Local Materials
Pervious pavement
"Smart" location
Reduced auto dependence
Housing/jobs proximity
Compact development/higher density
Walkable streets/pedestrian orientated
Building reuse/adaptive reuse
Alternate transportation
Other natural preservation/open space
Bike Racks
"Green" stormwater management
Native Landscaping
Wetland/water body conservation
Open community
Sustainable Design
Minimize site disturbance
Reduced impervious surfaces
Live/Work
Heat island reduction

Redevelopment approaches:
"Smart" location
Reduced auto dependence
Housing/jobs proximity
Compact development/higher density
Walkable streets/pedestrian orientated
Building reuse/adaptive reuse
Retail at street level
Office/Residential above retail
Streetscaping
Street furniture
Façade improvements
Road Improvements
Business improvement districts
Incentives for redevelopment and infill
Mixed Use development
Signage creation/improvement

With the Belmar project being located in a more affluent city (Lakewood's median income is $51,333), and nearly all economic indicators show positive overall change for the project, the theory that wealthier communities see more significant positive change holds up. However, Belmar's redevelopment saw in increase of 10 percent in the number of salaries under $40,800 while salaries over $40,800 saw a decrease. Lakewood's largest employers are government employers (City Data, 2009) which have average to lower salaries overall; the average normal government employee salary is around $41,000 (PayScale, 2009). This is a reasonable explanation for the large number of under $40,800 salaries in the area. Having a majority of government employees may also account for the decrease in private sector employers and new hires once the project was finished. Belmar is a rare case among redevelopment projects in the sense that it has negative changes in the private sector indicators upon completion; further evidence that all redevelopment projects are going to be unique, based on the adjacent neighborhoods.

Belmar is considered to be Lakewood's downtown. Lakewood never had a traditional downtown area before the redevelopment of an old mall site in Lakewood. Belmar is now the downtown and is bordered by medium density residential and commercial which are within easy walking distance of the project.

Tualatin Commons

Category: Sustainable Redevelopment
City, State: Tualatin, OR
Population: 26,303
Year of Project start: 2003

Year of Project end: 2005
Project Size: 4.75 blocks
Median Income of city ('05-'07): $59,821
Mean Income of city ('05-'07): $77,655
Types of Development: Retail/Commercial, Residential, Office, Open Space, Hotel
Reason for renewal: deleterious land uses, lack of flood protection, traffic congestion
Description: Tualatin is located 10 miles south of Portland and used to be known as an auto-oriented commercial development during the 1970s and 1980s. The town has been trying to implement a downtown renewal strategy for over 20 years. After many failed attempts, the town finally approved a redevelopment plan for Tualatin Commons. Centered around a manmade lake, Tualatin Commons has reused several buildings to create a mixed-use redevelopment comprised of office buildings, rowhouses, a hotel, “hoffices” (live/work), restaurants and a public plaza and promenade surrounding the lake (Terrain.org, 2009).

Green approaches:
Renewable energy source
Energy efficiency in buildings
Indoor Air Quality Improvements
Recycled materials [in construction]
Local Materials
Pervious pavement
"Smart" location
Reduced auto dependence
Housing/jobs proximity
Compact development/higher density
Walkable streets/pedestrian orientated
Building reuse/adaptive reuse
Alternate transportation
Other natural preservation/open space
Bike Racks
"Green" stormwater management
Native Landscaping
Wetland/water body conservation
Open community
Sustainable Design
Minimize site disturbance
Reduced impervious surfaces
Live/Work
Heat island reduction

Redevelopment approaches:
"Smart" location
Reduced auto dependence
Housing/jobs proximity
Compact development/higher density
Walkable streets/pedestrian orientated
Building reuse/adaptive reuse
Retail at street level
Office/Residential above retail
Streetscaping
Street furniture
Façade improvements
Road Improvements
Business improvement districts
Incentives for redevelopment and infill
Mixed Use development
Signage creation/improvement
(Terrain.org, 2009).

As Tualatin Commons was being completed, the study area had an increase in number of private sector new hires by over 40 percent. Along with this growth, the private sector

also saw progress in number of employers and average monthly earnings. Tualatin is similar to the Belmar redevelopment in that it has a higher median income. A more affluent town has less probability of an economic decline.

Tualatin is home to many factories, which are located on the south side of town, including a large Novellus Systems plant that manufactures and makes materials for semiconductors (City Data, 2009). This factory, being just a few miles outside of the study area for Tualatin Commons may have an impact on employment activity within the redevelopment focus area.

Tualatin's surrounding fabric is made up of mostly medium density residential and light commercial/office. This type of atmosphere is advantageous to the success of the project; having residential and office areas within walking distance allows for higher use of the mixed use development amenities.

Southside

Category: Economic Redevelopment
City, State: Greensboro, NC
Metropolitan Statistical Area (MSA): Greensboro-High Point, NC
Population: 698,497
Year of Project start: 2004
Year of Project end: 2005
Project Size: 2.5 blocks
Median Income of city ('05-'07): $39,824
Mean Income of city ('05-'07): $57,079
Types of Development: Retail/Commercial, Residential, Office, Open Space, Community
Reason for renewal: urban decay, lack of pedestrian orientation, housing deterioration

Description: The Southside community, a 10-acre revitalization project, is one of Greensboro, North Carolina's first significant mixed-use, infill projects. The revitalization, just one and a half blocks from Greensboro's historic main street, transformed a blighted area into a thriving, attractive district. The community capitalized on a rich stock of historic buildings and public spaces to restore this downtown area. Southside includes residential units, townhouses, commercial space, live/work units, retail, office, studio and other ground-floor space, as well as green space, civic uses, squares and pocket parks (Terrain.org, 2009).

Green approaches:
Alternate transportation
Open community
Historic preservation
Live/Work

Redevelopment approaches:
"Smart" location
Reduced auto dependence
Housing/jobs proximity
Compact development/higher density
Walkable streets/pedestrian orientated
Building reuse/adaptive reuse
Retail at street level
Office/Residential above retail
Streetscaping
Street furniture
Lighting improvements
Façade improvements
Improved Landscaping
Mixed Use development
New Open Space
Signage creation/improvement

Southside redevelopment is located southeast of downtown Greensboro. The half-mile buffer around the development, used for evaluation, touches the edge of the downtown and is about two miles away from the University North Carolina at Greensboro campus; both of these locations impact the employment within the study area. As construction of the redevelopment began to come to an end, total jobs increased by over 11 percent, while number of new hires in the private sector also increased. Southside has a major corridor running through the center of the development; this road, which was calmed using methods such as shortening building setbacks and creating on street parking, has now become a "grand boulevard with a distinctive, pedestrian-friendly streetscape" (Terrain.org, 2009), yet still acts as a passage into the development, bringing in employees from outside areas. Southside saw a decrease in number of employed residents

at project completion; this could be a consequence to being located so close to the downtown area. The attraction of living in the heart downtown may be the pull-away factor for this redevelopment project. Though employed residents decreased, number of employees earning over $40,800, who work in the study area, went up by 23 percent which is significant because the average median income of Greensboro is $39,824. The number of jobs under $40,800 also saw an increase of just over five percent, which shows Southside to be a diverse development. Though it can be considered diverse, Southside had a decrease in number of employed residents once the redevelopment was complete. This may, again, be due to the size of Greensboro; it is one of the smaller cities in the study and compared to the larger cities, smaller cities see less positive change in number of employed residents.

Southside is surrounded by mature neighborhoods and a more urban fabric that includes medium density commercial, office and retail. Southside is connected very well to these surrounding areas, encouraging walkability between communities.

Liberty Station

Category: Economic Redevelopment
City, State: San Diego, CA
Metropolitan Statistical Area (MSA): San Diego-Carlsbad-San Marcos, CA
Population: 3,001,072
Year of Project start: 2003
Year of Project end: 2006 (phase III)
Project Size: 20 blocks
Median Income of city ('05-'07): $60,185
Mean Income of city ('05-'07): $80,703
Types of Development: Retail/Commercial, Residential, Office

Open Space, Community, Hotel
Reason for renewal: closing of Navy base
Description: The Naval Training center in San Diego closed in 1995 and the city took advantage of its historic buildings and its prime location on San Diego Bay to redevelop it as Liberty Station. This redevelopment restores waterfront access to the public for the first time in 80 years, creates new parks and establishes a new historic district. The community, complete, will have over 100 acres of new parks and open space, a historic 9-hole golf course, shopping and restaurants, a civic/arts/cultural district, two hotels, offices, residential units, and schools (Liberty Station, 2009).

Green approaches:	Building reuse/adaptive reuse
Native Landscaping	Retail at street level
Historic preservation	Office/Residential above retail
Live/Work	Street furniture
	Lighting improvements
Redevelopment approaches:	Façade improvements
"Smart" location	Design guidelines
Reduced auto dependence	Incentives for redevelopment and infill
Housing/jobs proximity	Improved Landscaping
Compact development/higher density	Mixed Use development
Walkable streets/pedestrian orientated	New Open Space

As a former Naval training base, Liberty Station incorporates heavy residential, several acres of green space and mixed use within the redevelopment. The redevelopment plan claims that “working at Liberty Station will mean working among a diversified group of educational, service, retail and visitor-commercial businesses” (City of San Diego, 2009). Prior to redevelopment, the study area saw a large decline in number of private sector new hires; this is the norm with all projects; as redevelopment begins, there is naturally less new employers and therefore less new hires. After the project was in progress, the project study area saw an increase in new hires, employers and private sector monthly earnings. The number of employed residents also slightly went up by 2.5 percent, meaning people living in the study area began to work in the study area or vice-versa. An

increase in employment and residence in the study area means that the residents and employees are likely to spend their income at Liberty Station's establishments. Located in a larger city, Liberty Station had average overall economic changes of six percent, supporting the theory that larger cities have a better chance of progress with redevelopments.

Liberty Station is a large, 28-acre project. The surrounding areas include residential and light commercial, mostly restaurants and shops, and is already walkable so having the new redevelopment fits right into the existing fabric.

Main Street Mile

Category: Economic Redevelopment
City, State: Albany, NY
Metropolitan Statistical Area (MSA): Albany-Schenectady-Troy, NY MSA
Population: 853,919
Year of Project start: 2003
Year of Project end: 2006 (phase IV)
Project Size: 9 blocks
Median Income of city ('05-'07): $38,290
Mean Income of city ('05-'07): $49,365
Types of Development:
Retail/Commercial, Residential
Office, Open Space, Community
Reason for renewal: urban decay, lack of pedestrian orientation, improve connectivity between downtown and suburbs
Description: Main Street Mile is just a portion of a large redevelopment project along Albany's Central Avenue. Central Avenue links downtown Albany with the western suburbs; the corridor plays a major role in the physical structure and transportation network of the city. The redevelopment project incorporated urban design for a mixed use, historical, connected redevelopment (Central Improvement District, 2009).

Green approaches: Alternate transportation

Bike Racks
Open community

Redevelopment approaches:
"Smart" location
Reduced auto dependence
Housing/jobs proximity
Compact development/higher density
Walkable streets/pedestrian orientated
Building reuse/adaptive reuse
Retail at street level
Office/Residential above retail
Streetscaping
Street furniture
Lighting improvements
Public art
Façade improvements
Design guidelines
Business improvement districts
Incentives for redevelopment and infill
Reduced curb cuts
Improved Landscaping
Mixed Use development
New Open Space
(Central Improvement District, 2009).

The Main Street Mile redevelopment project is located in the heart of downtown Albany, New York. The number of employed residents witnessed a positive increase once the redevelopment was complete. With the average median income of Albany being $38,290, having an increase in jobs earning over $40,800 in the study area implies that higher paying jobs are locating within the study area. As is the case with the Main Street Mile project study area in 2004, when private sector number of employers is up, but the number of private sector new hires is down, it means that employees are coming from other areas to work in the study area.

The neighboring urban fabric consists of high density retail, office and commercial spaces along with medium to high density residential. The redevelopment is located on Albany's Central Avenue, the major corridor of the downtown. Having an existing business-oriented environment will help with the redevelopment's progress as the years go by.

Rowlett

Category: Economic Redevelopment
City, State: Rowlett, TX
Population: 55,541
Year of Project start: 2003
Year of Project end: 2005
Project Size: 5 blocks
Median Income of city ('05-'07): $78,043
Mean Income of city ('05-'07): $87,681
Types of Development: Retail/Commercial, Residential, Office, Open Space, Community
Reason for renewal: deteriorating roads, lack of pedestrian orientation and sense of community
Description: Rowlett is a community about 15 miles northeast of Dallas. As a smaller town, Rowlett proposed a redevelopment plan that began with utility and roadway improvements. Once this was completed Rowlett redeveloped its main street with improvements to the town center, façades and landscaping to create a more compact and walkable community (City of Rowlett, 2009).

Green approaches:
Alternate transportation
Bike Racks

Redevelopment approaches:
"Smart" location
Reduced auto dependence
Housing/jobs proximity
Compact development/higher density
Walkable streets/pedestrian orientated
Building reuse/adaptive reuse
Retail at street level
Streetscaping
Street furniture
Lighting improvements
Public art
Façade improvements
Road Improvements
Town Center creation/improvement
Utility improvements
Improved Landscaping
Repaving of roads/sidewalks
Roundabout
Mixed Use development
New Open Space
Signage creation/improvement

Rowlett's Main Street redevelopment project began construction in 2004 and immediately saw an increase in total jobs by over 600, or 16 percent. Rowlett is a bedroom suburb of Dallas which means that Dallas employment dynamics has impact on Rowlett's. Rowlett's major industries include educational and health services, retail/trade and finance. Rowlett's first phase of redevelopment included major road improvements

and at the end of 2003 and in the beginning of 2004, over 25 businesses opened and located in the city of Rowlett; the new businesses were primarily in the retail industry. This explains the increase in number of jobs across the board for the study area. Though a smaller city, Rowlett witnessed an overall economic change of 3.6 percent; this can be explained by the city's median income of $78,043, supporting the belief that wealthier cities are more profitable when it comes to redevelopments.

The surrounding area of the project area is made up of light commercial and medium to low density residential, all within walking distance of the downtown redevelopment. This, along with a major high school down the road, provides the project with a population very likely to visit the study area.

South Broad Street

Category: Economic Redevelopment
City, State: Chattanooga, TN
Metropolitan Statistical Area (MSA): Chattanooga, TN
Population: 514,568
Year of Project start: 2003
Year of Project end: 2006 (phase III)
Project Size: 12 blocks
Median Income of city ('05-'07): $35,913
Mean Income of city ('05-'07): $52,758
Types of Development: Retail/Commercial, Residential, Office, Open Space, Community, Hotel
Reason for renewal: urban decay, economic downtown, lack of pedestrian orientation
Description: South Broad is an area about a mile south of the heart of downtown Chattanooga. It has a history of being industrial and manufacturing-heavy and serves as an important corridor to the downtown. The redevelopment emphasizes more retail at the street level, improving the streetscape and creating a more walkable, pedestrian oriented environment (South Broad Street Redevelopment Group, 2009).

Green approaches:
Alternate transportation
Other natural preservation/open space
Bike Racks
Open community
Historic preservation

Redevelopment approaches:
"Smart" location
Reduced auto dependence
Housing/jobs proximity
Compact development/higher density
Walkable streets/pedestrian orientated
Building reuse/adaptive reuse
Retail at street level
Streetscaping
Street furniture
Lighting improvements
Façade improvements
Design guidelines
Business improvement districts
Incentives for redevelopment and infill
Reduced curb cuts
Town Center creation/improvement
Utility improvements
Improved Landscaping
Mixed Use development
New Open Space
Signage creation/improvement

Located south of the central business district of Chattanooga, TN, the South Broad District was once an economically struggling area. Low employment and factory closings led to economic turmoil. During redevelopment, the average change in number of jobs earning over $40,800 saw a small average increase of 0.6 percent, which is notable due to the average median income of Chattanooga being $35,913. As the redevelopment project was being completed, the economy saw positive changes in private sector new hires and private sector monthly earnings, however, this redevelopment project had an overall change of -5.0 percent. After additional research it was discovered that another redevelopment project, the 21st Century Waterfront Project, opened right before the South Broad District project in downtown Chattanooga. The other project was located in an already economically flourishing area. Having this happen was sure to make employment more difficult for another redevelopment project, in this case, South Broad.

With its location in a previously severely failing economic district, it may take longer than usualy before the South Broad District witnesses a turnaround.

The South Broad district is bordered by commercial, retail and office space. Though there are a few higher density residential complexes, the area is more focused on commerce.

FINDINGS

The redevelopment projects selected for this thesis vary in location, population size, income levels and project size. The differences are important and helpful in the understanding of redevelopment and sustainability effects. Redevelopment is inherently sustainable; the “sustainable” projects analyzed in this study are the redevelopments that go further into environmental and ecological approaches with redevelopment. Comparing economic data between two difference sets of projects (sustainable and economic) can offer more insight into particular approaches in redevelopment efforts.

Among the economic indicators, several trends were observed throughout all of the redevelopment projects. Trends in the size of the cities, in the income indicators, in the private sector categories, and in the employed residents indicator are important in determining the differences and similarities between economic and sustainable redevelopments. It must be noted, though, that the analysis is not a completely controlled analysis, outside factors within the city, region and even nation have the ability to

influence the economic activity within the selected study areas; it is unclear whether there is a distributive effect.

Size of Redevelopment Projects

The average number of employed residents is comparable in both sets of projects though the average number of jobs in the sustainable projects' study area is greater than the economic projects' study area. The two projects that have considerably larger number of jobs within the study area are the Brewery Blocks in Portland, Oregon and Second Street District in Austin, Texas. Portland and Austin are much denser, in terms of building types, than the other project cities. Though the study area size is similar to all others, the building types are larger and can house more companies and employees.

In looking at the difference in size among the sustainable projects and the economic projects, it can be questioned whether larger, or denser, towns are more able to afford and commit to sustainable design and redevelopments. The average number of jobs in the economic project study areas is 8,638; the average number of jobs in the sustainable project study areas is 28,627. Having a higher job-populated area could give cities more confidence, economically, in implementing a newer form of redevelopment, the sustainable approach. Smaller, less dense, areas may be weary of being unconventionally innovative. The sustainable redevelopment projects also all include a "top" environmentally-sustainable approach; in implementing these higher ticket approaches in more populated cities there is less probability of economic downturn. Does this indicate

that sustainable redevelopments are only viable in these particular areas such as areas with a large job base? The answer is not clear-cut; every city and town is different. In the argument for increasing the assurance of sustainability in cities and towns, however, having larger cities act as, almost, guinea pigs for the implementation of environmentally-sustainable approaches can set the stage for sustainability in other cities.

Income Indicator

Along with population and density of cities, the income indicators supply a few interpretations of the redevelopment's effect on the surrounding area. In 2000, the average median income in the United States was almost $42,000; the salary data provided by the OnTheMap tool pertains to $40,800 salaries. Among the economic indicators for the sustainable redevelopments, the lowest average percent change (0.263%) was in the "under $40,800 earnings" category while the percent change in the "over $40,800 earnings" category was 4.6 percent. The trend of an increase in jobs earning over $40,800 is also present among the economic redevelopment projects, which implies that the immediate effect of any type of redevelopment is an increase in jobs earning average to higher salaries. It seems reasonable to say that the increase in number of people earning the average to higher salaries signifies that the people employed in the study areas have somewhat of a disposable income and are likely to spend it within the study area. The increase in spending will presumably have a positive effect on the economy within and around the redevelopment, which contributes to the concept of expected induced impact. Expected induced impact is the idea that money earned within an area, generally stays

within the area. For example, an employee at a company uses his money to buy food at the grocery store in the area; the grocery store worker takes that money and uses it to buy a shirt from a retailer in the area. The money earned in the area adds to the economic activity of the area.

Another analysis of economic progress within the redevelopment projects points to the median incomes of the cities in which the projects are located. In the cities with higher median incomes, Tualatin, Lakewood, Rowlett and San Diego, the outcome of their redevelopment projects show a positive overall change among economic indicators. The higher income areas seem to do better economically after redevelopment compared to the lower income cities. This may be a result of the spending power among the residents of the area. Higher incomes typically imply more flexibility in spending. A redevelopment will almost certainly flourish in a higher income area. This again begs the question, are redevelopments only viable in areas with higher income and/or higher population?

Another trend within the income indicator suggests that any level of income with sustainable redevelopment will see economic progress. As the Table 1 demonstrates, both higher and lower income cities with redevelopment projects saw economic improvement with sustainable approaches; within the economic projects, the higher income cities did well, however the lower income cities (Chattanooga, TN) experienced a negative economic outcome in the analysis.

	Income: High	Income: Low
Economic Redevelopment	+	-
Sustainable Redevelopment	+	+

Table 1: Income Level and Redevelopment

The trend of lower income cities with economic redevelopments having worse economic effects begs the question, "Why do lower income cities have less of an immediate economic outcome than other cities with redevelopment?" Future research and supplementary case studies could begin to reveal this trend.

Private Sector Indicators

With the increase in average to higher salary jobs the private sector is examined to learn what part it plays in the increase of salaries. In observing the trends of the private sector employers and private sector monthly earnings, there is a positive average change in both sets of projects. This indicates that with any type of redevelopment, sustainable or economic, the private sector seems to have a positive outcome with a redevelopment project. With the average change in total jobs being negative upon completion within the economic redevelopments, it is assumed that it is the public sector that is on the decline. What can this imply? Do property values increase so much upon completion that private sector establishments are the only entities that can afford to locate in the redeveloped

areas? If, in fact, property values do increase, then that in itself is evidence of economic progress for the redevelopment.

Age Indicator

It is interesting to look at age group change in redevelopments. Who, in terms of age, is generally attracted to a redevelopment? In this study, with the selected projects, there seem to be no prevalent trends in an age group's employment in the redeveloped areas. To pursue a clearer understanding of this indicator, further observation and evaluation of other cases would provide additional, valuable economic information; the spending habits of age groups vary and it may be helpful to know where certain age groups spend their incomes (Bureau of Labor Statistics, 2000).

Employed Residents Indicator

The employed residents indicator shows the number of employed people who live within the boundaries of the study area of the redevelopment project. Each of the 10 redevelopment projects include the renovation or addition of residential space in the project area and also contain existing residential neighborhoods in the study area or in surrounding areas; as redevelopment projects come to be completed, it is important to observe the changes in residents once the project is complete as this indicates changes in population which can then be linked to property values. Within the larger cities, San Diego, Albany, Portland, Austin and Atlanta, the number of employed residents increased once the project was finished. The smaller cities, Rowlett, Greensboro, Chattanooga,

Tualatin and Lakewood all saw a decrease in number of employed residents at completion. Larger cities, according to this study, seem to be more appealing to residents; perhaps the more offered and more diverse amenities attract more residents to the area.

Compared to the negative average change (-0.8 percent) in employed residents in the economic projects, the sustainable projects have an average positive change of over four percent. According to this study, people are locating more within the study areas of the sustainable redevelopment projects or cities with larger populations and job base. More residents within the study area, and perhaps within walking distance of work and entertainment, fosters further sustainability as vehicle miles traveled can be cut down.

Overall change among all indicators

In every case but two, the average economic change across all economic indicators at project completion was positive change. Average economic change looks at the averages for the indicators, total jobs, salaries, new hires, number of employers and employed residents. The sustainable redevelopments had four out of five projects with an average positive chance. According to the selected projects in this report, the redevelopment process proves to be immediately beneficial to the surrounding economy in both cases of redevelopment. This can be attributed to the attraction of a revitalized area. People seem to have a fascination with renovated buildings and areas. Having big boxes and "cookie-cutter" residences and office complexes becoming the norm, it seems that society is starting to crave something different, something meaningful, and something less wasteful

(Solutions for America, 2000). Residents, visitors and workers are intrigued and attracted to a restored and improved historic area and therefore will locate, visit and work within that area. Companies are also picking up on this trend and taking advantage of locating in revitalized areas.

APPROACHES TO REDEVELOPMENT

There are several redevelopment approaches that are used in the literature and in the selected redevelopment projects in order to breathe life into downtowns and communities. The following section presents two different sets of approaches; one sustainable and one common.

Sustainable Redevelopment Framework

After a thorough review of the literature, an evaluation of sustainable development rating systems and a review of several project case studies, over 25 sustainable redevelopment approaches have been derived and compiled to create a sustainable redevelopment framework. The framework provides guidance and structure for redeveloping a city or community to be sustainable and for evaluating the sustainability of a redevelopment project.

No redevelopment project is the same. Implementation of certain sustainable approaches will vary according to the location, size, funding, and timeline of a project. This issue makes a specialized weighting system difficult and hasty. In looking at common and

prevalent sustainable redevelopment approaches in the selected sustainable projects, it can be illustrated the conditions of certain methods. The framework presented gives cities and communities a general idea of the characteristics and requirements of each approach.

Table 2: Sustainable Redevelopment Framework

Sustainable Redevelopment Framework

1 = Low 2 = Medium 3 = High	**Cost**	**Space Required**	**Time to impact**	**Longevity**	**Materials needed**	**Sustainable Project Use**	**Economic Project Use**
Renewable energy source	2 - 3	2 - 3	2 - 3	3	3	5	
Energy efficiency in buildings	2 -3	2	2	3	1 - 3	5	
Recycled materials [in construction]	1		1	3	1	5	
Local Materials [in constuction]	2		1	3		5	
Existing location	1		1	3		5	5
Compact development	2	1 - 2	1	2		5	5
Walkable streets/pedestrian orientation			1	3		5	5
Building reuse/adaptive reuse	1		1	2	1	5	5
Alternate transportation	1 - 3	1 - 3	1 - 2	2 - 3	1 - 3	5	4
Land preservation/open space	1		1		1	5	1
Bike Racks	1	1	1	3	1	5	4
Indoor Air Quality Improvements	1 - 3	2	1 - 2	3	1 - 2	4	0
Green Roof	2	1 - 3	1	3	2 - 3	4	0
Pervious/Permeable pavement	1	1 - 3	1	2	1 - 2	4	0
"Green" stormwater management	1 - 3	1 - 3	1	2	1 - 3	4	0
Native Landscaping	1		2	3	1	4	1
Wetland/water body conservation	1		2	2		4	0
Open community	1		1	2		4	3
Solar Orientation			1 - 2	3		3	0
Historic preservation	1		1	2	1 - 2	3	3
Minimize site disturbance	2		2	2	2	3	0
Reduced impervious surfaces			1	2	1	3	0
Live/Work Units	2	2	2	2	2	3	2
"Green" wastewater management	2		2	3	2	2	0
Heat island reduction	1 - 3		2 - 3	3	2	2	0
Floodplain avoidance	1		1	2		2	0
Energy efficient windows	2		2 - 3	2 - 3	2	2	0
Low water use fixtures	1 - 2	1	1 -2	2	2	2	0
Light pollution reduction	2		1	2	2	1	0
Daylighting	1 - 2		1	3	2	1	0

The approaches in the framework are listed in order of number of times the approach was used by the sustainable redevelopment projects. There are four "top" sustainable approaches that are present in the five sustainable redevelopment projects, not present in the economic projects that stand out as more significant according to this study. The four methods are as follows:

- Renewable energy source
- Energy efficiency in buildings
- Recycled materials in construction, and
- Local materials for construction.

The "top" approaches are described in further detail for clarification below.

Renewable Energy Source

The presence of a renewable energy source in any area of the United States, though becoming more acceptable, is still quite rare. Renewable energy is energy generated from natural resources, such as sunlight, wind, rain/water, tides and geothermal heat, all of which are renewable or naturally replenished. "Renewable energy is derived from natural processes that are replenished constantly. In its various forms, it derives directly from the sun, or from heat generated deep within the earth. Included in the definition is electricity and heat generated from solar, wind, ocean, hydropower, biomass, geothermal resources, and biofuels and hydrogen derived from renewable resources" (International Energy Agency, 2009). Examples of renewable energy sources include solar panels, photovoltaic cells, wind farms, and hydro power plants/systems.

When a redevelopment takes place in an urban area, some renewable energy sources may not be as easy to implement and/or use such as wind farms and hydro power plants. Smaller wind turbines, solar panels, and photovoltaic collectors are the key energy sources used in the projects in this thesis.

A criticism of some renewable sources is their variable nature, but renewable power sources can actually be integrated into the grid system quite well (Lovins, 2009). Variable but forecastable renewables (wind and solar cells) are very reliable when integrated with each other, existing supplies and demand. Mostly, renewable power generally needs less backup than utilities already bought to combat big coal and nuclear plants' intermittence (Lovins, 2009).

Energy Efficiency in Buildings

Each sustainable redevelopment project utilizes energy efficiency in their buildings. Though there are a few rating systems for "green" building, all projects cite the use or guidance of the LEED building and/or renovation criteria. Energy efficiency in buildings incorporates several approaches in itself. And some of the other listed approaches in the sustainable redevelopment framework pertain to energy efficiency in buildings. It is important, though, to highlight energy efficient buildings as a singular approach in order to emphasize the reliability, adaptability and often simplicity of building "green." There are numerous ways to accomplish some level of energy efficiency in buildings and in

pointing this out it is hoped that cities and communities will strive to implement some of these approaches.

Each redevelopment project is in itself sustainable. Each of the projects presented in this report have reused buildings, utilized adaptive reuse and/or historic preservation. From the projects, the dominant green buildings methods used were:

- Local materials
- Recycled construction materials
- Daylighting
- Energy efficient windows
- Low flow plumbing
- Energy conservation features (i.e. insulation, lighting)
- Recycling provisions
- Wastewater treatment
- Indoor air quality improvements

Effective green buildings are more than just a random collection of environmental friendly technologies; they require careful, systemic attention to the full life cycle impacts of the resources embodied in the building and to the resource consumption and pollution emissions over the building's complete life cycle (Levin, 1996).

Recycled Materials in Construction

Recyclable materials include construction and demolition materials, iron and steel slags, scrap tires, pulp/paper mill residuals and other materials used in buildings and structures (EPA, 2009). Many of these materials have engineering, chemical, and physical properties that make them valuable resources, but are often disposed as waste. Recycling materials in construction embodies green design by conserving natural resources and reducing energy use and greenhouse gas emissions associated with virgin materials (EPA, 2009). In addition, recycled construction materials are often less expensive than the virgin materials they replace. As the demand for construction materials continues to rise in the U.S. and abroad, designing with recycled materials can make good economic sense for project owners and builders (EPA, 2009).

Building and other materials can be recycled in nearly all aspects of construction for buildings, roads, and other structures. In some cases, they can even improve the quality of the products in which they are used (EPA, 2009). For example, drywall can be recycled into new drywall, used in cement production, used as a soil amendment or plant nutrient (CMRA, 2009). Concrete and asphalt rubble can be crushed and used as road base, aggregate in pavements, structural fill, or drainage material (EPA, 2009). Roofing shingles can be shredded and recycled in pavement, replacing costly virgin asphalt; other markets for roofing shingles include dust control on rural roads, new shingle production and fuel (CMRA, 2009).

Recycling construction materials has several benefits regarding the ecology and environment; it conserves natural resources by reducing the demand for raw materials, it conserves energy and water since manufacturing with recycled materials requires less processing than extracting raw materials, it reduces air and water pollution since manufacturing from recycled materials is generally a cleaner process and uses less energy, it minimizes what is discarded, which maximizes limited landfill capacities and recycling construction materials protects our health and the environment when harmful substances, which can be recycled, are removed from the waste stream and processed back into useable products (Nebraska Energy Office, 2008). “The safest, easiest and least expensive ways to reduce material production and disposal impacts are to produce less, use less, re-use more and recycle everything possible. Of the millions of tons of garbage that Americans produce each year it is estimated that more than 70 percent of it could be recycled (Nebraska Energy Office, 2008).

Local Materials for Construction

A sound choice for sustainable development, the use of local materials cuts down on materials transportation costs and educates the community about quality construction methods that are readily available (Habitat, 2009). In almost all localities, nature provides materials that are able to be taken and processed to later be used to construct buildings, structures and landscapes (Green Home Building, 2001). Utilizing the proximity of a resource or construction materials company in development will save the environment from degradation caused by higher transportation requirements and/or packaging material

necessary for shipping (Nebraska Energy Office, 2008). Using local materials for construction in a redevelopment project will further enable the emphasis of a sustainable lifestyle in the redevelopment and surrounding area.

Again, the approaches and concepts included in the framework will vary according to the area in which it is being implemented. Several approaches' requirements and characteristics vary based on how it is built, the materials used and so on. For example, the green roof can be more or less expensive depending on size of location, plants and vegetation used and maintenance requirements. These concerns should be kept in mind when considering implementation.

With each sustainable redevelopment project the true end success will depend on a change of lifestyle and mindset for many of the residents and visitors of the project. Sustainability is not a finite endeavor (Buntin, 1997). Though some approaches included in the framework are small and seemingly inconspicuous, such as the bike racks and daylighting, their existence is still important in creating a more whole-systems, sustainable environment.

Common Redevelopment Approaches

Along with a collected list of sustainable approaches, common redevelopment methods were also collected to show the value of each based on the projects in this study. The following two tables display each project's approaches to redevelopment.

	1	2	3	4	5	
Project Name:	Brewery Blocks	Tualatin Commons	Second Street District	Glenwood Park	Belmar	*Average*
City, State:	Portland, OR	Tualatin, OR	Austin, TX	Atlanta, GA	Lakewood, CO	
Metropolitan Statistical Area (MSA):	Portland-Vancouver-Beaverton, OR	N/A	Austin-Round Rock, TX	Atlanta-Sandy Springs-Marietta, GA	N/A	
Population:	2,207,462	26,303	1,652,602	5,376,285	140,590	1,880,648
Miles from City center:	< 1	< 1	< 1	2	<1	
Year of Project start:	2003	2003	2002	2003	2003	
Year of Project end:	2005	2005	2005 (up to phase II)	2005	2005	
Project Size:	5 blocks	4.75 blocks	7 blocks	7 blocks	22 blocks	
Median Income of city ('05-'07):	$45,512	$59,821	$48,227	$44,163	$51,333	$49,811
Mean Income of city ('05-'07):	$63,114	$77,655	$68,799	$79,259	$64,874	
Types of Development:						
Retail/Commercial	■	■	■	■	■	
Residential	■	■	■	■	■	
Office	■	■	■	■	■	
Open Space	■	■	■	■	■	
Community	■		■		■	
Industrial						
Hotel		■	■			
Reason for renewal:	Loss of jobs	Deleterious land uses	Urban decay	urban decay	urban decay	
	Brewery out of business in 1 999	lack of flood protection	Enhance identity/image	Loss of jobs	economic turmoil	
		Inaccessibility/inadequacy of public facilities	Lack of pedestrian focus		mall closing	
		Traffic congestion				
Environmentally Sustainable Criteria						**Total**
Renewable energy source	■	■	■	■	■	5
Energy efficiency in buildings	■	■	■	■	■	5
Local Materials	■	■	■	■	■	5
Recycled materials [in construction]	■	■	■	■	■	5
Indoor Air Quality Improvements	■		■	■	■	4
Green Roof	■	■	■	■		4
Pervious pavement		■	■	■	■	4
Alternate transportation	■	■	■	■	■	5
Land preservation/open space	■	■	■	■	■	5
Bike Racks	■	■	■	■	■	5
"Green" stormwater management	■	■	■	■		4
Native Landscaping		■	■	■	■	4
Wetland/water body conservation		■	■	■	■	4
Open community	■	■	■		■	4
Sustainable Design		■	■		■	3
Solar Orientation	■		■	■		3
Historic preservation	■	■		■		3
Minimize site disturbance	■		■		■	3
Reduced impervious surfaces	■		■		■	3
Live/Work		■		■	■	3
"Green" wastewater management		■	■			2
Heat island reduction			■		■	2
Floodplain avoidance		■		■		2
Energy efficient windows	■		■			2
Low water use fixtures	■		■			2
Light pollution reduction	■					1
Daylighting	■					1
Redevelopment Approaches						
Existing Location	■	■	■	■	■	5
Reduced auto dependence	■	■	■	■	■	5
Housing/jobs proximity	■	■	■	■	■	5
Compact development	■	■	■	■	■	5
Walkable streets/pedestrian orientation	■	■	■	■	■	5
Building reuse/adaptive reuse	■	■	■	■	■	5
Retail at street level	■	■	■	■	■	5
Office/Residential above retail	■	■	■	■	■	5
Streetscaping	■	■	■	■	■	5
Street furniture	■	■	■	■	■	5
Lighting improvements						0
Public art						0
Façade improvements	■	■	■	■	■	5
Road Improvements		■	■	■	■	4
Design guidelines						0
Business improvement districts			■		■	2
Incentives for redevelopment and infill	■		■		■	3
Reduced curb cuts						0
Town Center creation/improvement		■		■		2
Utility improvements						0
Improved Landscaping						0
Repaving of roads/sidewalks						0
Mixed Use development	■	■	■	■	■	5
New Open Space						0
Signage creation/improvement		■	■	■	■	4
Number of Sustainable Approaches	19	18	22	17	17	
Number of Standard Redevelopment Approaches	13	15	16	15	16	
Total Number of Redevelopment Approaches	32	33	38	32	33	
Average Project Economic Outcome	+	+	+	-	+	

Table 3: Sustainable Project Redevelopment Approaches

	6	7	8	9	10	
Project Name:	Southside	Liberty Station	Main Street Mile	Rowlett	South Broad Street	*Average*
City, State:	Greensboro, NC	San Diego, CA	Albany, NY	Rowlett, TX	Chattanooga, TN	
Metropolitan Statistical Area (MSA):	Greensboro-High Point, NC	San Diego-Carlsbad-San Marcos, CA	Albany-Schenectady-Troy, NY MSA	N/A	Chattanooga, TN	
Population:	698,497	3,001,072	853,919	55,541	514,568	1,024,719
Miles from City center:	<1	3	<1	<1	<1	
Year of Project start:	2004	2003	2003	2003	2003	
Year of Project end:	2005	2006 (phase III)	2006 (phase IV)	2005	2006 (phase III)	
Project Size:	2.5 blocks	20 blocks	9 blocks	5 blocks	12 blocks	
Median Income of city ('05-'07):	$39,824	$60,185	$38,290	$78,043	$35,913	$50,451
Mean Income of city ('05-'07):	$57,079	$80,703	$49,365	$87,681	$52,758	
Types of Development:						
Retail/Commercial	■	■	■	■	■	
Residential	■	■	■	■	■	
Office	■	■	■	■	■	
Open Space	■	■	■	■	■	
Community	■	■	■	■	■	
Industrial						
Hotel		■			■	
Reason for renewal:						
Environmentally Sustainable Criteria						**Total**
Renewable energy source						0
Energy efficiency in buildings						0
Local Materials						0
Recycled materials [in construction]						0
Indoor Air Quality Improvements						0
Green Roof						0
Pervious pavement						0
Alternate transportation	■		■	■	■	4
Land preservation/open space					■	1
Bike Racks			■	■	■	3
"Green" stormwater management						0
Native Landscaping		■				1
Wetland/water body conservation						0
Open community	■	■	■	■	■	5
Sustainable Design						0
Solar Orientation						0
Historic preservation	■	■			■	3
Minimize site disturbance						0
Reduced impervious surfaces						0
Live/Work	■	■				2
"Green" wastewater management						0
Heat island reduction						0
Floodplain avoidance						0
Energy efficient windows						0
Low water use fixtures						0
Light pollution reduction						0
Daylighting						0
Redevelopment Approaches						
Existing Location	■	■	■	■	■	5
Reduced auto dependence	■	■	■	■	■	5
Housing/jobs proximity	■	■	■	■	■	5
Compact development	■	■	■	■	■	5
Walkable streets/pedestrian orientation	■	■	■	■	■	5
Building reuse/adaptive reuse	■	■	■	■	■	5
Retail at street level	■	■	■	■	■	5
Office/Residential above retail	■	■	■			3
Streetscaping	■		■	■	■	4
Street furniture	■	■	■	■	■	5
Lighting improvements	■	■	■	■	■	5
Public art			■	■		2
Façade improvements	■	■	■	■	■	5
Road Improvements				■		1
Design guidelines		■	■		■	3
Business improvement districts			■		■	2
Incentives for redevelopment and infill		■	■		■	3
Reduced curb cuts			■			1
Town Center creation/improvement	■			■	■	3
Utility improvements				■	■	2
Improved Landscaping	■	■	■	■	■	5
Repaving of roads/sidewalks				■		1
Mixed Use development	■	■	■	■	■	5
New Open Space	■	■	■	■	■	5
Signage creation/improvement	■			■	■	3
Number of Sustainable Approaches	4	4	3	3	5	
Number of Standard Redevelopment Approaches	17	16	20	20	20	
Total Number of Redevelopment Approaches	21	20	23	23	25	
Average Project Economic Outcome	+	+	+	+	-	

Table 4: Economic Project Redevelopment Approaches

Effects of Redevelopments

From the Project Redevelopment Approaches tables it can be seen that each project implemented several different redevelopment approaches, both sustainable and "standard" or common. It is interesting to look at the average economic change for each project. The two negative projects, Glenwood Park in Atlanta and South Broad Street in Chattanooga, both implemented a comparable amount of redevelopment approaches as the others. So why did they have a worse economic outcome? Though additional research was conducted to answer this question, there is no definitive answer. Only further research and supplemental case studies will reveal a trend.

The term "downtown redevelopment" has almost become a catchphrase across the country. When cities and communities decide to redevelop, typically, the main driver of redevelopment is economic improvement purposes. Hundreds of cities and towns have revitalized in some way or have created a plan for redevelopment. With the process becoming somewhat mundane, could the humdrumness be hurting towns and communities economically? Companies and businesses may not be as attracted or fascinated with a standard redevelopment of a community. With the increased awareness in environmental and ecological issues, a sustainable redevelopment offers something new, something innovative, something captivating that captures companies' attention. Such a new shift in a process may be what gives companies a new edge in the economy.

FURTHER RESEARCH AND RECOMMENDATIONS

The research presented in this thesis, like redevelopment, is ongoing and could take off in several directions from here: identification and evaluation of supplementary redevelopment case studies; performance of a more exact economic analyses of redevelopment as more accurate data comes in from the Census Bureau's OnTheMap tool and other sources; development of town and community indicators to truly test the viability of redevelopment and implementation of sustainable approaches by a redeveloping town or community; determination of long-range effects of redevelopment projects.

Supplementary Case Studies

Many accurate conclusions can be drawn from the 10 redevelopment projects presented, however they do not provide a large sample. Additional projects should be studied and evaluated to refine the research, methodology and sustainable redevelopment framework. Analysis of other projects can answer many questions: Are more affluent cities or towns able to maintain redevelopments better than less affluent cities? Are sustainable redevelopments only viable in denser atmospheres where number of jobs is high? Certainly, other case studies can provide a wealth of information.

Further Economic Analysis

There are several paths available for further research within this topic. An additional economic analysis can be performed to find association between different sustainable

approaches and changes in economics. Do higher ticket approaches create more jobs or attract more employers? In speaking of sustainable approaches, a more specified sustainable development weighting system may be further researched in order to more properly evaluate magnitude of the approaches. Research and debate on the topic of a weighting system is currently a major issue in the sustainable development field; so, as decisions are made, different approaches to weighing systems can be created.

Testing the Framework

The framework presented offers recommendations and should be tested to discover if the approaches are reliable and beneficial. A redeveloping city, town or community would be the ideal tester. When the framework is tested, a few questions can be asked in order to more clearly understand the impact; which approaches are the easiest/hardest to implement into the community? Which approaches have had the greatest/least impact on the environment/ecology? Testing the redevelopment framework will provide an analysis of which efforts appear to be most appropriate. In implementing the sustainable redevelopment framework, conditions vary widely among locations. A trial by only one redeveloping area will not prove how these approaches can benefit another area. It does not seem sensible to make the sustainable redevelopment framework very precise based on a few project case studies and developing rating and weighting systems. The framework's usefulness is determined in its flexibility and acceptance by a variety of cities and communities. The economic indicator analysis and sustainable redevelopment

framework presented in this thesis offers assurance for sustainability in towns and communities.

Long-Range Effects

The 10 projects evaluated in this thesis have been completed very recently. Their immediate, one to two year economic effects have only been able to be analyzed. As the years go by, it will be important to assess and compare the ability or inability of the redevelopments to maintain economic viability. Does the immediate improvement in the economy wear off faster in the economic redevelopments or in the sustainable redevelopments? What factors play into the maintainability of a redeveloped area; business development plans, public awareness and education? It is these types of questions that can provide further insight to the impact and true sustainability of redevelopment.

Recommendations

From the results of this project and the knowledge gained from the literature review, it can be recommended that redeveloping cities and communities more strongly consider sustainable redevelopment approaches. Though the process is still in the developing stages itself, the approaches and economic outcomes presented here give evidence of economic benefit in redevelopments.

Sustainable redevelopments have the possibility of being more expensive in the beginning than economic redevelopments, but the longevity of certain sustainable redevelopment approaches must be understood. Cities and communities can and should promote the cost savings associated with environmentally-sustainable improvements; "enough green rehabs and new construction projects have taken place over the past few years to provide significant evidence that environmentally-sustainable improvements almost always produce economic benefits as well" (Smith, 2009). Any redevelopment project is already sustainable; if it is located in an urban fabric, characteristics of sustainability, such as walkability, live and work proximity units, reduced vehicle miles traveled, and connection to and availability of alternative transportation options will naturally be present. It is the next-step "green" approaches that will help improve and sustain the redevelopment area's atmosphere.

DISCUSSION

Given the nationwide trend toward urban redevelopment and the increase of interest and awareness in sustainability, any process of redevelopment other than sustainable redevelopment can have serious environmental consequences. All of the redevelopment projects presented in this report are useful examples of towns and communities that have attempted to reverse negative trends related to central business district disinvestment and poor downtown planning.

Redevelopment must first and foremost be as unique as the community it affects. To say that one approach can be applied to all towns would be inaccurate; it must incorporate physical land uses, environmental issues, and economic efforts in order to ensure its progress and success over the long term. Sustainable redevelopment requires the same and places emphasis on environmental and ecological approaches both before and after construction.

From the economic analysis performed, a conclusion can be drawn to say that sustainable redevelopment is achievable and has similar, not poorer, economic outcomes as economic redevelopments. From the research it can be stated that one of the main concerns with sustainable redevelopment is cost. However, this myth is broken based on research which states that sustainable development does not have to cost more and can be just as affordable as regular development or redevelopment.

Sustainable development and redevelopment have proven to improve the quality of life in an area and increase the desire of residents, employees and visitors to live in, work in and enjoy the area. With sustainable redevelopment, the quality of the place increases as more durable and lasting materials and approaches are used. People and businesses' interest in sustainability is on the rise and they may be willing to pay a little more if it means they are lightening their impact on the environment (Smith, 2009). So, in looking at the economic outcomes of the sustainable and economic redevelopments, it can be asked "Why not?" Why not use sustainability in a redevelopment? The sustainable approaches

have a longer influence on the area which surrounds it. Several sustainable approaches will also render more savings in the long run. The core value of sustainable development is meeting the needs of the present without compromising the ability of future generations to meet their own needs. Why not redevelop in a way that will make it a little easier for the next generation? Building quality, air quality, water quality and energy savings can all be improved and conserved in sustainable redevelopment. These are issues that, if cleared, can make a place more attractive and desirable for residents and employers, present and future.

As the main driver of this study is the concept of sustainability, interpretations of the 10 redevelopment projects warrant a concluding discussion in order to tie together the lessons learned in the three aspects of sustainability.

Economic Perspective

The process of redevelopment itself can be moderately expensive, or it can be very expensive. Redevelopment though, is commonly less costly than new development when buildings are reused. In sustainable redevelopment, it is recognized that the upfront costs are more than the upfront costs of economic redevelopment projects. Though this has constantly been an issue of debate, these costly expenses can be seen as long term investments in the projects longevity. As the country becomes more aware of the environmental impacts of development decisions and people's daily actions, the understanding of preservation and conservation is becoming clearer. Although

sustainable redevelopments tend to me more expensive upfront, returns on investment is usually faster and property values typically increase at a faster rate than the economic redevelopment values (Smith, 2009).

Because not all cities are created equal, to make generalizations of economic effects of all sustainable redevelopment attempts would be flawed. Outside factors in different cities can play a role in the changes in number of jobs, earnings and other economic indicators. Letting the outside factors discourage research, though, is irrational and hindering of sustainability progress, as the change in indicators of the study areas is to some extent related to redevelopment efforts. So, "why not engage in sustainable redevelopment?" The research and study show that sustainable redevelopment is economically feasible and can produce just as beneficial economic results as economic redevelopment.

Environmental and Ecological Perspective

The study and expansion of sustainable redevelopment in this thesis has produced several approaches that cities, towns and communities can implement in their redevelopment efforts. To reiterate, however, each approach will be distinctive to the area of implementation. And the analyses performed on the economic indicators will give cities perspective when it comes to economic improvement.

"You are on the right track when your solution for one problem accidentally solves several others. You decide to minimize automobile use to conserve fossil fuels, for

example, and realize this will reduce noise, conserve land by minimizing streets and parking, multiply opportunities for social contact, beautify the neighborhood, and make it safer for children." (Stitt, 1999). Environmental preservation often leads to positive but previously unforeseen results, as is such with Tualatin Commons and Glenwood Park. Tualatin's construction of a lake not only created an amenity that increased real estate values and social and recreational opportunities, it also eliminated two acres of paved, impervious streets. When grading land for a more efficient waste water management system at the Glenwood Park project site, bizarrely, 40,000 cubic yards of wood chips were discovered underground, enough to cover a football field 36 feet deep, and had to be removed. The wood chips were taken away and used as fuel at a power plant in Alabama. Both results of these more environmentally sustainable methods were unexpected yet show that environmentally conscious approaches to redevelopment often extend beyond what is initially assumed.

In support of the question, "why not redevelop sustainably?" the environmental/ecological perspective in redevelopment presents substantiation on long term energy savings, improved employee satisfaction and productivity, and acts as a foundation for a sustainable lifestyle within the community.

Social Perspective

Though society and the social sphere of cities and communities were not the main focus of this report, leaving out acknowledgment of the social perspective would leave us with

a wobbly chair as the true meaning of sustainability is like a “three-legged-stool” incorporating the economy, the environment/ecology and society.

Even though the physical design of a town or community can be appealing, citizens and visitors may need to be encouraged to use the newly created spaces. Community events and festivals are successful at getting people into the area, but marketing and other efforts are necessary for increasing pedestrian activity. In several of the selected redevelopment projects, the communities created signage and way-finding methods in order to educate and help the public become familiar with the area.

Being located in “open” communities and “existing/smart” locations, each of the redevelopment projects included in this study make access to the redevelopment area easy and equitable. The projects are all located near already existing neighborhoods, having alternative transportation options, which allow for anyone and everyone to visit.

CONCLUSION

Redevelopment has indicated to be beneficial in revitalizing a downtown or urban area. Sustainable redevelopment has also shown to be just as economically viable as economic redevelopment. From this analysis it can be questioned why sustainable redevelopment is not more frequently utilized. With environmental and ecological concerns coming more to the forefront of our development and lifestyle decisions, it is strongly encouraged that cities and communities learn from the analysis conducted in this report and use

sustainability as their foundation in redevelopment efforts. The evaluation and comparison presented in this thesis give assurance in sustainable redevelopment and offer cities and towns the chance to improve their environment while improving their economy.

APPENDICES

APPENDIX A: Sustainable Projects Economic Analysis Data

Appendix A: Sustainable Projects Economic Analysis Data

	Total Jobs	%	Jobs: 31 and older	%	Jobs: 30 and younger	%	Over $40,800 Earnings	%	Under $40,800 Earnings	%	Private Sector: # Employers	%	Private Sector: # New Hires	%	Private Sector: Avg monthly earn.	%	Employed Residents	%	Avg change after project complete
Brewery Blocks																			
2002	40,185		29,077		11,108		14,799		25,368		1,969		3,310		2,820		2,364		
	-1,496	-3.723%	-704	-2.421%	-792	-7.130%	-162	-1.095%	-1,316	-5.188%	-1	-0.051%	-588	-17.764%	59	2.092%	72	3.046%	
2003	38,689		28,373		10,316		14,637		24,052		1,968		2,722		2,879		2,436		
	-66	-0.171%	-4	-0.014%	-62	-0.601%	546	3.730%	-612	-2.544%	43	2.185%	2	0.073%	78	2.709%	17	0.698%	
2004	38,623		28,369		10,254		15,183		23,440		2,011		2,724		2,957		2,453		
	267	0.691%	-43	-0.152%	310	3.023%	154	1.014%	113	0.482%	46	2.287%	678	24.890%	179	6.053%	450	18.345%	
2005	38,890		28,326		10,564		15,337		23,553		2,057		3,402		3,136		2,903		
	335	0.861%	-52	-0.184%	417	3.947%	1,004	6.546%	-639	-2.713%	2	0.097%	109	3.204%	95	3.029%	1,008	34.723%	
2006	39,225		28,274		10,981		16,341		22,914		2,059		3,511		3,231		3,911		**8.383%**
AVERAGE	39,122	-0.585%		-0.693%		-0.190%		2.549%		-2.491%		1.130%		2.601%		3.471%	2,813	14.203%	
Tualatin Commons																			
2002	15,350		11,392		3,958		5,108		10,242		807		1,530		2,948		3,880		
	709	4.619%	453	3.976%	256	6.468%	130	2.545%	579	5.653%	9	1.115%	-245	-16.013%	66	2.239%	-121	-3.119%	
2003	16,059		11,845		4,214		5,238		10,821		816		1,285		3,014		3,759		
	463	2.883%	451	3.808%	12	0.285%	300	5.727%	163	1.506%	-4	-0.490%	7	0.545%	-26	-0.863%	54	1.437%	
2004	16,522		12,296		4,226		5,538		10,984		812		1,292		2,988		3,813		
	384	2.324%	262	2.131%	122	2.887%	78	1.408%	306	2.786%	29	3.571%	206	15.944%	-75	-2.510%	219	5.744%	
2005	16,906		12,558		4,348		5,616		11,290		841		1,498		2,913		4,032		
	1,371	8.110%	811	6.458%	560	12.879%	401	7.140%	970	8.592%	30	3.567%	603	40.254%	131	4.497%	-219	-5.432%	
2006	18,277		13,369		4,908		6,017		12,260		871		2,101		3,044		3,813		**10.199%**
AVERAGE	16,623	4.484%		4.093%		5.630%		4.205%		4.634%		1.941%		10.182%		0.841%	3,859	-0.343%	
2nd Street District																			
2002	80,871		62,671		18,197		31,675		49,195		1,607		3,095		3,262		1,127		
	-257	-0.318%	491	0.783%	-745	-4.094%	903	2.851%	-1,160	-2.358%	-14	-0.871%	-93	-3.005%	-26	-0.797%	5	0.444%	
2003	80,614		63,162		17,452		32,578		48,035		1,593		3,002		3,236		1,132		
	55	0.068%	654	1.035%	-601	-3.444%	1,526	4.684%	-1,470	-3.060%	32	2.009%	-484	-16.123%	44	1.360%	-66	-5.830%	
2004	80,669		63,816		16,851		34,104		46,565		1,625		2,518		3,280		1,066		
	-14,963	-18.549%	-14,968	-23.455%	7	0.042%	-7,685	-22.534%	-7,278	-15.630%	19	1.169%	334	13.264%	284	8.659%	183	17.167%	
2005	65,706		48,848		16,858		26,419		39,287		1,644		2,852		3,564		1,249		
	13,280	20.211%	13,757	28.163%	-479	-2.841%	10,443	39.528%	2,835	7.216%	36	2.190%	191	6.697%	-12	-0.337%	164	13.131%	
2006	78,986		62,605		16,379		36,862		42,122		1,680		3,043		3,552		1413		**8.378%**
AVERAGE	77,369	0.353%		1.632%		-2.584%		6.132%		-3.458%		1.124%		0.209%		2.221%	1,197	6.228%	
Glenwood Park																			
2002	1,856		2,493		543		1,176		1,860		98		78		2,634		3,657		
	-47	-2.532%	60	2.407%	-72	-13.260%	56	4.762%	-68	-3.656%	-11	-11.224%	-41	-52.564%	-351	-13.326%	-132	-3.610%	
2003	1,809		2,553		471		1,232		1,792		87		37		2,283		3,525		
	-80	-4.422%	-123	-4.818%	-62	-13.163%	-45	-3.653%	-140	-7.813%	-2	-2.299%	4	10.811%	527	23.084%	230	6.525%	
2004	1,729		2,430		409		1,187		1,652		85		41		2,810		3,755		
	50	2.892%	60	2.469%	44	10.758%	48	4.044%	56	3.390%	10	11.765%	233	568.293%	-312	-11.103%	-203	-5.406%	
2005	1,779		2,490		453		1,235		1,708		95		274		2,498		3,552		
	6	0.337%	-67	-2.691%	43	9.492%	91	7.368%	-115	-6.733%	16	16.842%	-182	-66.423%	356	14.251%	545	15.343%	
2006	1,785		2,423		496		1,326		1,593		111		92		2,854		4,097		**-3.930%** 7.902%
AVERAGE	1,792	-0.931%		-0.658%		-1.543%		3.130%		-3.703%		3.771%		115.029%		3.227%	3,717	3.213%	
Belmar																			
2002	7,103		4,850		2,253		1,855		5,248		390		617		2,476		5,009		
	1,014	14.276%	950	19.588%	64	2.841%	757	40.809%	257	4.897%	-11	-2.821%	293	47.488%	-119	-4.806%	183	3.653%	
2003	8,117		5,800		2,317		2,612		5,505		379		910		2,357		5,192		
	-79	-0.973%	-86	-1.483%	7	0.302%	-151	-5.781%	72	1.308%	34	8.971%	-268	-29.451%	215	9.122%	-213	-4.102%	
2004	8,038		5,714		2,324		2,461		5,577		413		642		2,572		4,979		
	962	11.968%	448	7.840%	514	22.117%	399	16.213%	563	10.095%	13	3.148%	127	19.782%	-150	-5.832%	-44	-0.884%	
2005	9,000		6,162		2,838		2,860		6,140		426		769		2,422		4,935		
	-122	-1.356%	-188	-3.051%	66	2.326%	-676	-23.636%	554	9.023%	-3	-0.704%	-61	-7.932%	1,349	55.698%	-148	-2.999%	
2006	8,878		5,974		2,904		2,184		6,694		423		708		3,771		4,787		**8.541%**
AVERAGE	8,227	5.979%		5.724%		6.896%		6.901%		6.331%		2.148%		7.472%		13.545%	4,980	-1.083%	
Average % change all sustainable projects		1.860%		2.020%		1.642%		4.584%		0.263%		2.023%		27.098%		4.661%		4.444%	6.314% Average overall change at completion of all projects
Range of change	75,578	6.910%		6.416%		8.440%		4.352%		10.034%		2.647%		114.820%		12.705%		15.286%	5.633% Average change in total jobs after completion
Average number of jobs Standard Deviation	28,627 30,685.28		21,835		7,025		11,343		17,516		995		1,682		2,940		3,314		10.953% Average change of employed residents at completion

APPENDIX B: Economic Projects Economic Analysis Data

Appendix B: Economic Projects Economic Analysis Data

	Total Jobs	%	Jobs: 31 and older	%	Jobs: 30 and younger	%	Over $40,800 Earnings	%	Under $40,800 Earnings	%	Private Sector: # Employers	%	Private Sector: # New Hires	%	Private Sector: Avg monthly earn.	%	Employed Residents	%	Avg change after project complete
Economic Projects																			
Rowlett																			
2002	3,740		2,614		1,126		770		2,970		303		309		2,657		8,143		
	-78	-2.086%	-41	-1.568%	-37	-3.286%	-4	-0.519%	-74	-2.492%	-2	-0.660%	8	2.589%	140	5.269%	-73	-0.896%	
2003	3,662		2,573		1,089		766		2,896		301		317		2,797		8,070		
	20	0.546%	-11	-0.428%	31	2.847%	38	4.961%	-18	-0.622%	12	3.987%	61	19.243%	-70	-2.503%	1,637	20.285%	
2004	3,682		2,562		1,120		804		2,878		313		378		2,727		9,707		
	616	16.730%	335	13.076%	281	25.089%	142	17.662%	474	16.470%	1	0.319%	89	23.545%	-133	-4.877%	-1,714	-17.657%	
2005	4,298		2,897		1,401		946		3,352		314		467		2,594		7,993		**3.612%**
	120	2.792%	86	2.969%	34	2.427%	81	8.562%	39	1.163%	14	4.459%	-5	-1.071%	501	19.314%	300	3.753%	
2006	4,418		2,983		1,435		1,027		3,391		328		462		3,095		8,293		
AVERAGE	3,960	4.496%		3.512%		6.769%		7.666%		3.630%		2.026%		11.077%		4.301%	8,441	1.371%	
Southside																			
2002	16,062		12,584		3,478		4,712		11,350		626		695		2,541		1,732		
	-989	-6.157%	-511	-4.061%	-478	-13.744%	-6	-0.127%	-983	-8.661%	-12	-1.917%	-157	-22.590%	4	0.157%	-132	-7.621%	
2003	15,073		12,073		3,000		4,706		10,367		614		538		2,545		1,600		
	-1,580	-10.482%	-1,209	-10.014%	-371	-12.367%	-417	-8.861%	-1,163	-11.218%	-17	-2.769%	132	24.535%	80	3.143%	2	0.125%	
2004	13,493		10,864		2,629		4,289		9,204		597		670		2,625		1,602		
	-32	-0.237%	-10	-0.092%	-22	-0.837%	267	6.225%	-299	-3.249%	14	2.345%	-198	-29.552%	-40	-1.524%	78	4.869%	
2005	13,461		10,854		2,607		4,556		8,905		611		472		2,585		1,680		
	1,542	11.455%	1,299	11.968%	243	9.321%	1,058	23.222%	484	5.435%	-25	-4.092%	87	18.432%	327	12.650%	-88	-5.238%	
2006	15,003		12,153		2,850		5,614		9,389		586		559		2,912		1,592		**6.642%**
AVERAGE	14,618	-1.355%		-0.550%		-4.406%		5.115%		-4.423%		-1.608%		-2.294%		3.607%	1,641	-1.966%	
Liberty Station																			
2002	6,405		4,367		2,038		1,157		5,248		462		571		2,313		4,009		
	-461	-7.198%	-290	-6.641%	-171	-8.391%	6	0.519%	-467	-8.899%	15	3.247%	-161	-28.196%	-246	-10.636%	-85	-2.120%	
2003	5,944		4,077		1,867		1,163		4,781		477		410		2,067		3,924		
	-7	-0.118%	-44	-1.079%	37	1.982%	47	4.041%	-54	-1.129%	3	0.629%	67	16.341%	218	10.547%	12	0.306%	
2004	5,937		4,033		1,904		1,210		4,727		480		477		2,285		3,936		
	-84	-1.415%	-72	-1.785%	-12	-0.630%	-2	-0.165%	-82	-1.735%	30	6.250%	-18	-3.774%	114	4.989%	29	0.737%	
2005	5,853		3,961		1,892		1,208		4,645		510		459		2,399		3,965		
	-152	-2.597%	-123	-3.105%	-29	-1.533%	31	2.566%	-183	-3.940%	17	3.333%	40	8.715%	438	18.258%	101	2.547%	
2006	5,701		3,838		1,863		1,239		4,462		527		499		2,837		4,066		**6.051%**
AVERAGE	5,968	-2.832%		-3.153%		-2.143%		1.740%		-3.926%		3.365%		-1.728%		5.789%	3,980	0.367%	
Main Street Mile																			
2002	6,330		4,051		2,279		1,234		5,096		376		473		2,473		6,747		
	-231	-3.649%	-25	-0.617%	-361	-15.840%	-13	-1.053%	-218	-4.278%	-11	-2.926%	-118	-24.947%	135	5.459%	180	2.668%	
2003	6,099		4,026		1,918		1,221		4,878		365		355		2,608		6,927		
	108	1.771%	262	6.508%	1	0.052%	172	14.087%	-64	-1.312%	13	3.562%	166	46.761%	40	1.534%	-186	-2.685%	
2004	6,207		4,288		1,919		1,393		4,814		378		521		2,648		6,741		
	-168	-2.707%	-167	-3.895%	154	8.025%	48	3.446%	-216	-4.487%	-12	-3.175%	-200	-38.388%	-96	-3.625%	-133	-1.973%	
2005	6,039		4,121		2,073		1,441		4,598		366		321		2,552		6,608		
	-392	-6.491%	-307	-7.450%	206	9.937%	-139	-9.646%	-253	-5.502%	19	5.191%	-24	-7.477%	243	9.522%	147	2.225%	
2006	5,647		3,814		2,279		1,302		4,345		385		297		2,795		6,755		**0.594%**
AVERAGE	6,064	-2.769%		-1.363%		0.544%		1.708%		-3.895%		0.663%		-6.013%		3.222%	6,756	0.059%	
South Broad District																			
2002	13,727		9,840		3,887		3,375		10,352		237		741		2,576		1,834		
	-716	-5.216%	-560	-5.691%	-156	-4.013%	-165	-4.889%	-551	-5.323%	7	2.954%	-136	-18.354%	92	3.571%	-38	-2.072%	
2003	13,011		9,280		3,731		3,210		9,801		244		605		2,668		1,796		
	15	0.115%	-34	-0.366%	49	1.313%	509	15.857%	-494	-5.040%	-5	-2.049%	6	0.992%	-13	-0.487%	-30	-1.670%	
2004	13,026		9,246		3,780		3,719		9,307		239		611		2,655		1,766		
	-235	-1.804%	-189	-2.044%	-46	-1.217%	-267	-7.179%	32	0.344%	-5	-2.092%	-453	-74.141%	251	9.454%	38	2.152%	
2005	12,791		9,057		3,734		3,452		9,339		234		158		2,906		1,804		
	-2,459	-19.224%	-1,229	-13.570%	-1,230	-32.941%	-40	-1.159%	-2,419	-25.902%	-12	-5.128%	16	10.127%	82	2.822%	-247	-13.692%	
2006	10,332		7,828		2,504		3,412		6,920		222		174		2,988		1,557		**-5.019%**
AVERAGE	12,577	-6.532%		-5.418%		-9.214%		0.657%		-8.980%		-1.579%		-20.344%		3.840%	1,751	-3.821%	
Average % change all economic projects		-1.799%		-1.394%		-1.690%		3.377%		-3.519%		0.573%		-3.860%		4.152%		-0.798%	2.376% Average overall change at completion of all projects
Range of change	10,658	11.028%		8.930%		15.984%		7.009%		12.610%		4.973%		31.421%		2.567%		5.192%	-0.025% Average change in total jobs after completion
Average of all years	8,638		6,319		2,336		2,317		6,321		404		462		2,634		4,514		-6.363% Average change in employed residents after completion
Standard Deviation	4,661.55																		

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