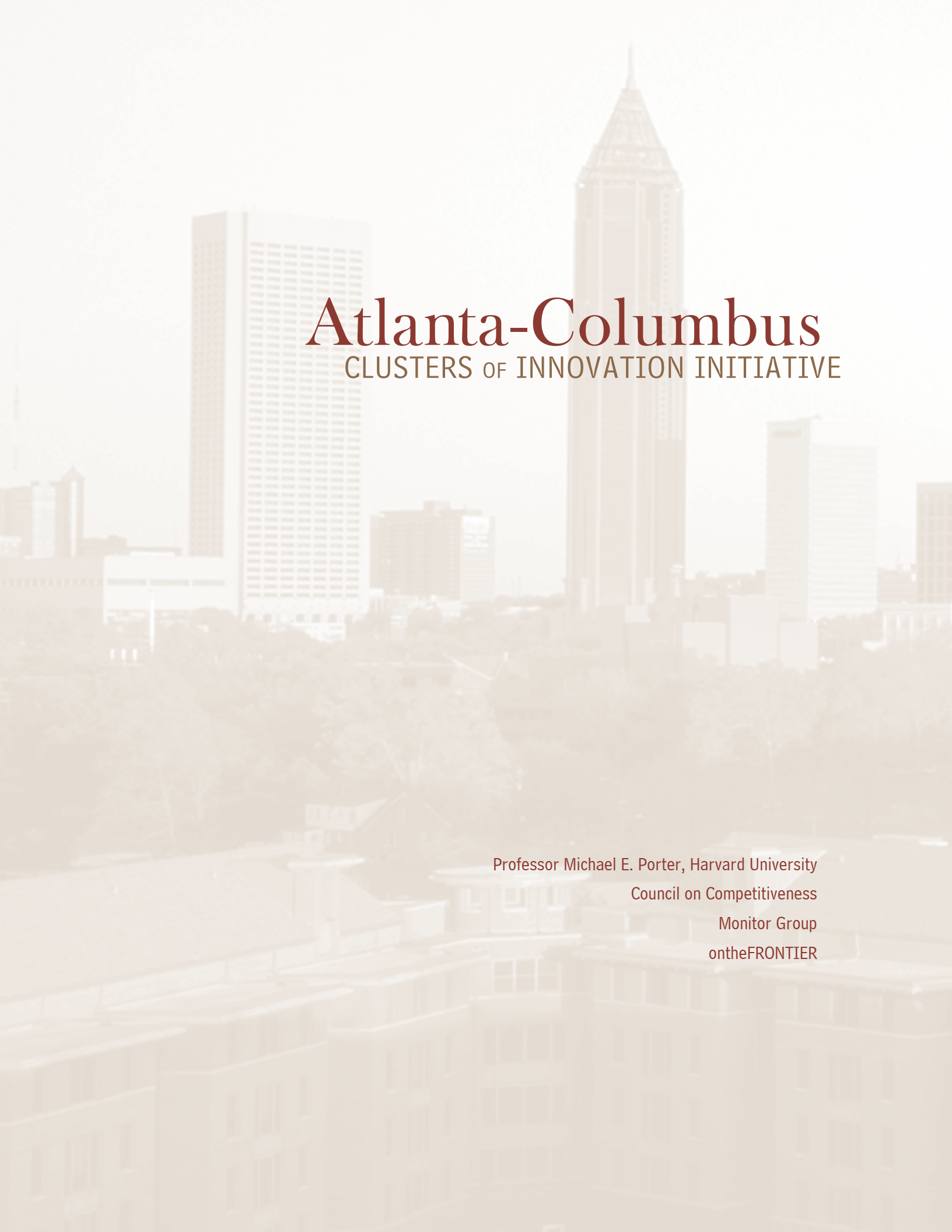
Professor Michael E. Porter, Harvard University
Council on Competitiveness
Monitor Group
ontheFRONTIER

Atlanta-Columbus

CLUSTERS OF INNOVATION INITIATIVE

- ATLANTA-COLUMBUS
- PITTSBURGH
- RESEARCH TRIANGLE
- SAN DIEGO
- WICHITA



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CLUSTERS OF INNOVATION INITIATIVE: REGIONAL FOUNDATIONS OF U.S. COMPETITIVENESS

CONTENTS

Foreword by the Co-Chairs of the Clusters of Innovation Initiative

Since its founding nearly two decades ago, the Council on Competitiveness has addressed a wide range of economic issues affecting the nation, including trade policy, technology policy, the federal budget, and workforce skills. Competitiveness has tended to be seen primarily from a federal perspective, and national policies and circumstances surely affect the prosperity of our economy. However, the Clusters of Innovation Initiative was undertaken with the realization that the real work of raising productivity and innovative capacity usually occurs not in our nation's capital, but in the cities and regions where firms are based and competition actually takes place.

Regional economies are the building blocks of United States competitiveness. The nation's ability to produce high-value products and services depends on the creation and strengthening of regional clusters of industries that become hubs of innovation. Understanding is growing about how these clusters enhance productivity and spur innovation by bringing together technology, information, specialized talent, competing companies, academic institutions, and other organizations. Close proximity and the accompanying tight linkages yield better market insights, more refined research agendas, larger pools of specialized talent, and faster deployment of new knowledge.

Utilizing a unique database developed at the Institute for Strategy and Competitiveness at the Harvard Business School, we are now able to systematically measure the relative strength of regional economies and their clusters and track their economic and innovation performance over time. In addition, a team consisting of individuals at Monitor Group, ontheFRONTIER, the Council on Competitiveness, and the Institute have conducted surveys, in-depth interviews, and strategic analyses in order to assess the strengths and challenges of the region.

This regional report examines the composition and performance of the Atlanta regional economy, how industry clusters developed and innovation arose, how clusters affected the region's economic future, and how the region can establish a strategy and action program to drive its economy and clusters forward. The framework employed and the lessons learned apply to many regions of the country.

We wish to acknowledge the support we received from the national steering committee, advisors in the Atlanta-Columbus region, the many individuals who gave their valuable time to be surveyed and interviewed, and the many project sponsors. All of you have helped us to create a unique knowledge base and a process for catalyzing action. Your thoughts and insights are embedded in this report, and will, we hope, benefit not only the five regions that participated in the study but other parts of the country as well.

F. Duane Ackerman
Co-Chair, Clusters of Innovation Initiative
Chairman & CEO, BellSouth Corporation

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ACKNOWLEDGEMENTS

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Professor Porter provided theoretical and methodological framework for the Initiative and led the research and writing of this report.

Randall Kempner, ontheFRONTIER, and Kurt Dassel, Monitor Group, are the report's principal authors. Mark Fuller and Jeff Grogan of the Monitor Group provided overall project direction and editorial advice.

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Lily Rappoli, Alyson Lee, and Julie Sherman at the DesignStudio at Monitor Group illustrated, designed, and created the layout of the regional reports and this report.

Almost 300 business and government leaders contributed to this project in some way by providing background information, submitting to interviews, completing surveys, and offering their views. While this report aims to reflect the consensus of those interviewed and surveyed, it cannot do justice to all their contributions. Any errors, omissions, or inconsistencies are the responsibility of the report writers and not any one individual or institution.

For additional information on this research, contact Randall Kempner at ontheFRONTIER (e-mail: Rkempner@onthefrontier.com), Kurt Dassel at Monitor Group (e-mail: Kurt_Dassel@Monitor.com) or Michelle Lennihan at the Council on Competitiveness (e-mail: Lennihan@compete.org).

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HIGHLIGHTS

Regional Competitiveness and Innovative Capacity

- The economic goal for Atlanta should be a high and rising standard of living.
- Achieving this goal depends upon creating a high quality business environment that fosters innovation and rising productivity.
- Efficiency is important, but the fundamental driver of long-term prosperity is innovation.
- Strong and competitive clusters are a critical component of a good business environment and are the driving force behind innovation and rising productivity in a region.
- All levels of government can influence the business environment and the productivity of clusters.
- Universities and specialized research centers are a driving force behind innovation.
- While government and universities can help foster a favorable business environment, companies and industries must ultimately achieve and sustain competitive advantage.
- Formal and informal institutions for collaboration, such as regional economic development organizations and alumni of large influential companies, are important contributors to economic development in advanced economies.

Atlanta's Successes Over the Past Decade

- Atlanta added more than 600,000 new jobs, the most of any major U.S. metro area.
- Unemployment in Atlanta has been below the Georgia and U.S. average throughout the 1990s.
- The number of establishments in the Atlanta region grew four times faster than the U.S. average. The number of fast-growth firms also well exceeded the U.S. average.
- Atlanta transitioned from a major U.S. business hub into an internationally recognized business center.
- Although wages have grown at an average of 4.5% a year over the decade, the cost of living in the region has increased faster than wages.

Strengths

- Atlanta has very strong air transportation and communications infrastructure.
- Atlanta's location, cultural amenities, and climate have attracted talented workers and made an important contribution to the region's standard of living.
- Atlanta is home to numerous well-regarded higher education institutions, especially in engineering, medicine, and communications.
- Atlanta has benefited greatly from a large pool of scientists, engineers, and skilled technicians.
- Strong workforce development programs have helped firms develop skilled workers and the region to retain firms.
- The state government has a long and ongoing tradition of funding science-based economic development initiatives.
- The sense of regional pride and self-confidence inspires leaders to attempt major economic development efforts and draws regional residents to work together.

Challenges

- Economic Performance
  - There is an increasing gap between regional wages and regional cost of living.
  - Many groups, particularly low income workers, did not benefit significantly from the prosperity created in the recent period of growth.
- Infrastructure Strains
  - Rapid economic and population growth have put a strain on the region's transportation infrastructure, which degrades business efficiency and the regional quality of life.
  - Air pollution remains a major issue.
  - Basic services like water and sewer are also in danger of being overwhelmed.
- Human Assets
  - The regional economy faces current or imminent shortages in the supply of marketing and management professionals, scientists, engineers, and skilled labor.
  - Increases in cost of living threaten to decrease Atlanta's ability to attract additional skilled labor.
  - Uneven K-12 education threatens to exclude major portions of the regional population from access to its higher education institutions and higher-paying jobs.
- Innovation
  - Despite growth, patenting performance by regional firms still significantly trails firms from competitive regions.
  - The process of transferring technology from the universities has been described as slow and cumbersome.
- Collaboration
  - Regional government collaboration is weak.
  - Atlanta has a strong overall regional collaborative institution; however, cluster-specific institutions for collaboration are lacking.

The Need for New Directions

- Atlanta's new challenge is to focus not just on growth, but on the prosperity of all its citizens.
- The region needs to move from an efficient low cost manufacturing and service center to a locus of high value-added products and innovation.
- Atlanta's success in building strong higher education institutions needs to be extended to all levels of the educational system.
- Atlanta needs to develop great institutions, not just great leaders.
- Rather than focus on building great projects, Atlanta's leaders need to develop ongoing economic development processes.
- Instead of relying on disparate organizations, Atlanta must develop stronger, ongoing regional collaboration among institutions.

Opportunities

- Unlock the commercial potential in universities:
  - Improve knowledge transfer
  - Create facilities to foster networking
- Attract additional non-university research institutions.
- Focus on technology in addressing the environmental, traffic management, and logistics issues—key areas that challenge quality of life.
- Develop stronger university ties to emerging and established clusters.
- Identify and pursue additional opportunities at the intersection of clusters (e.g., Internet banking; logistics software).
- Continue to develop international ties, with special focus on opportunities in Latin America.

KEY CHALLENGES AND OPPORTUNITIES FOR COLUMBUS, GA

Challenges

- Developing greater recognition for Columbus as a business location nationally and internationally
- Moving from a town with some big companies to a region with strong industry clusters
- Leveraging links to Atlanta without losing local identity

Opportunities

- Develop an explicit economic development strategy to build the region's financial services cluster around existing anchor firms.
- Expand efforts to support entrepreneurial start-ups in the region; promote location of spin-outs of anchor firms in the region.

EXECUTIVE SUMMARY

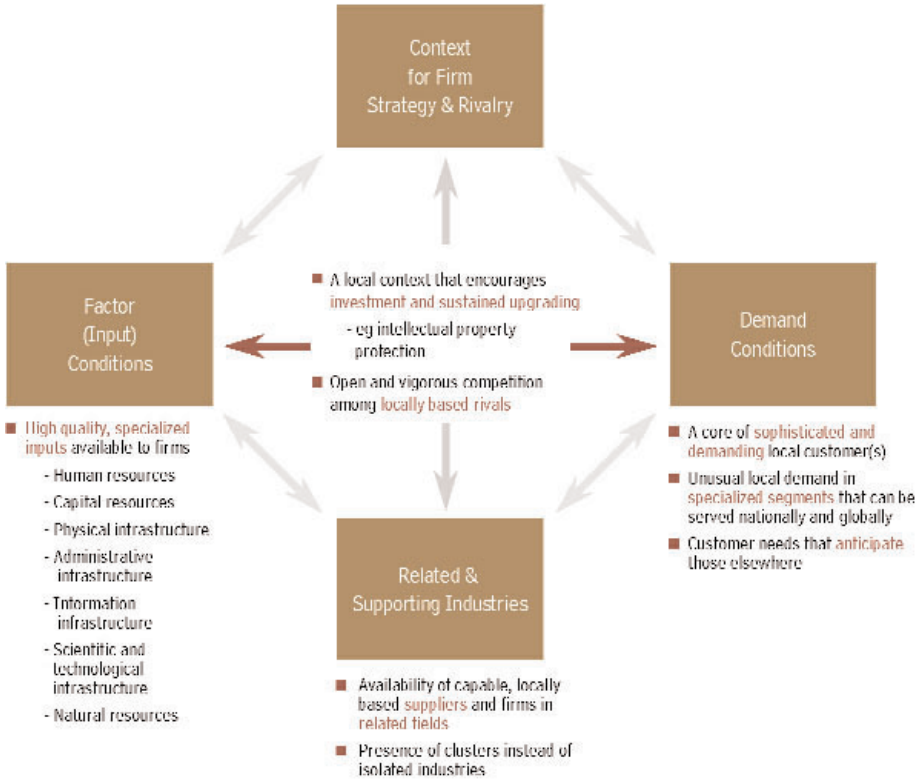
REGIONAL FOUNDATIONS OF U.S. COMPETITIVENESS

The Determinants of Regional Competitiveness and Innovative Capacity

The central economic goal for Atlanta should be to attain and sustain a high and rising **standard of living** for its citizens. The ability to earn a high and rising standard of living depends on increasing **productivity,** which, in turn, depends on innovation. The central challenge then in enhancing prosperity is to create the conditions for sustained innovation output.

A critical driver of innovation output is the quality of the regional **business environment** in which firms operate. This environment is embodied in four broad areas that affect the productivity that can be achieved as well as the rate of innovation (see Exhibit 1).

Exhibit 1: Determinants of Regional Productivity



- **Factor conditions.** Achieving high levels of innovation and productivity growth depends on the presence of high quality and specialized pools of human resources, basic research, applied technology, infrastructure, and sources of capital that are tailored to the needs of particular industries.
- **Demand conditions.** The quality of demand at home has a strong influence on the process of creating and improving products and services. Sophisticated customers in the region press firms to improve and offer insights into existing and future customer needs.

- **Context for firm strategy and rivalry.** The rules, incentives, and pressures governing the type and intensity of local rivalry have a fundamental influence on productivity policies that encourage investment, protect intellectual property, and foster productivity growth.
- **Related and supporting industries.** Local sourcing from capable suppliers based in the region can enhance productivity and improve the capacity for innovation through allowing quicker and less costly communication, fostering the flow of ideas, and enhancing flexibility through outsourcing.

These four areas of the diamond shown above are self-reinforcing and act as a system. Regional rivalry, for example, stimulates the development of unique pools of specialized skills and the formation or attraction of specialized suppliers. Active local rivalry also upgrades regional demand by creating more demanding customers.

Clusters and Productivity

The workings of these attributes lead to the formation of **clusters**, or geographically proximate groups of interconnected companies and associated institutions in a particular field, linked by customer, supplier, or other relationships.

Once a cluster forms, the industries that constitute it become mutually reinforcing. Information flows freely, and innovation spreads rapidly through the relationships among customers and suppliers. Institutions such as colleges and universities adapt to cluster needs. Rivalry in one industry spreads to other industries in the cluster through spin-offs or related diversification.

Through a cumulative process that often occurs over several decades, the region becomes a repository of specialized expertise, technology, and institutions for competing in a given field.

Clusters innovate faster because they draw on local networks that link technology, resources, information, and talent. Strong competitive local pressures increase incentives for a cluster participant to innovate. Clusters build the basis for **specialized** skills and capabilities and enable competitive advantage in world markets.

The Role of Government on Competitiveness

Government at all levels has an influence on the business environment and the innovative potential of clusters. Government's proper role is to improve the business environment rather than to intervene directly in the competitive process.

- Government has four fundamental roles in the economy:
- Improve the quality of basic inputs that firms draw upon, such as human resources, physical and technological infrastructure, and capital;
- Create rules, regulations, and incentives that encourage innovation and upgrading. Through regulations, tax policy, and antitrust enforcement, government policies influence the climate in which firms compete;
- Build upon and reinforce the formation of local clusters; and
- Encourage local firms and citizens to choose to compete, by educating them about the imperative of international competition and articulating an overarching economic strategy.

The Role of the Private Sector in the Business Environment

While government can help to create a favorable climate for competition, it is companies and industries that must ultimately achieve and sustain competitive advantage. To do so means they must recognize the central role of innovation. This means selling to the most demanding of buyers; seeking out buyers with the most difficult needs; establishing norms that exceed tough regulatory hurdles or product standards; and fostering a work environment of continuously upgrading skills and productivity.

Institutions for Collaboration

Institutions for collaboration are formal and informal organizations and networks that (1) facilitate the exchange of information and technology; and (2) foster various kinds of coordination and collaboration that can improve the business environment in a cluster or in the overall economy (see Exhibit 2). They are effective tools through which companies can upgrade the innovative capacity of their cluster and regional economy.

Exhibit 2: Select Institutions for Collaboration in Atlanta-Columbus

Private Sector	Joint Private/Public
■ Metro Atlanta Chamber of Commerce ■ Technology Association of Georgia ■ Central Atlanta Progress ■ Columbus Chamber of Commerce ■ Georgia Chamber of Commerce	■ Georgia Research Alliance (GRA) ■ Georgia Center for Advanced Telecommunications Technologies (GCATT) ■ Advanced Technology Development Center (ATDC) ■ Intellectual Capital Partnership Program (ICAPP) ■ Atlanta Regional Consortium for Higher Education (ARCHE)
Informal Networks	**Public Sector**
■ Georgia Tech Alumni Association ■ Other University Alumni Associations	■ Yamacraw Mission ■ Research Atlanta (Georgia State University) ■ Atlanta Regional Commission

The Composition of Regional Economies

Regional economies are composed of three main types of activities:

- **Local clusters.** These clusters are found in every region and produce goods and services which are needed by the local population (e.g., retail trade).
- **Traded clusters.** Traded clusters produce products and services that are in competition with other regions and nations. They trade across the nation or the globe (e.g., the automotive or medical devices clusters). These clusters tend to be concentrated in a small number of regions.
- **Natural resource clusters.** Natural resource clusters are found in locations where a particular natural resource is abundant.

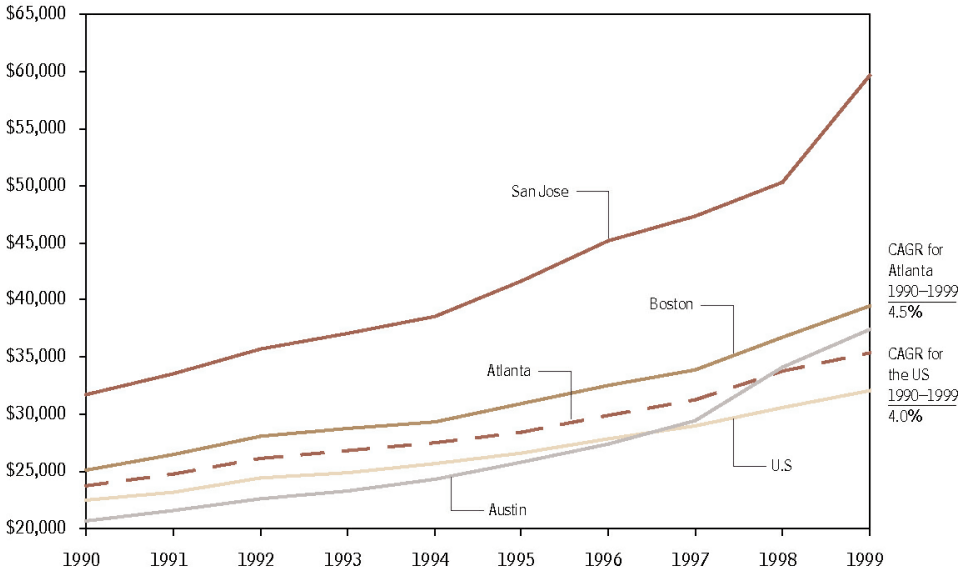
Traded clusters drive regional prosperity. While local clusters account for roughly two-thirds of employment in an average region, traded clusters have the greater influence on the prosperity and economic growth of a region. Average wages in traded clusters are roughly $13,000 a year higher than wages in local clusters. This is because traded cluster firms are typically the source of sustained innovation that drives regional and national economic growth. Traded cluster growth is also less constrained by the size of the local markets, and their success creates much of the demand for local clusters. Increases in wages paid by firms in traded clusters are strongly correlated with increases in local cluster wage levels.

THE ATLANTA-COLUMBUS REGIONAL ECONOMY

Overall Economic Performance Indicators

- **Employment.** Along with the region's population growth, the Atlanta economy enjoyed impressive job creation over the last decade, creating more than 600,000 new civilian jobs over the period and doubling the national growth rate. Employment in Atlanta was 2.3 million in 2000, up from 1.7 million in 1990.
- **Unemployment.** In 2000, the Atlanta unemployment rate stood at 2.8%, well below the 6.2% rate the region posted in 1992, its worst year in the 1990s. Though the recent economic downturn has increased the unemployment rate, Atlanta is still well below U.S. and Georgia averages.
- **Wages.** In 1999, average wages in Atlanta were $35,380, above the national average of $32,100 and well above the Georgia average of $30,870. Average wages in 1999 for select benchmark regions, however, were $37,475 for Austin, $39,455 for Boston, and $59,650 for San Jose (see Exhibit 3).

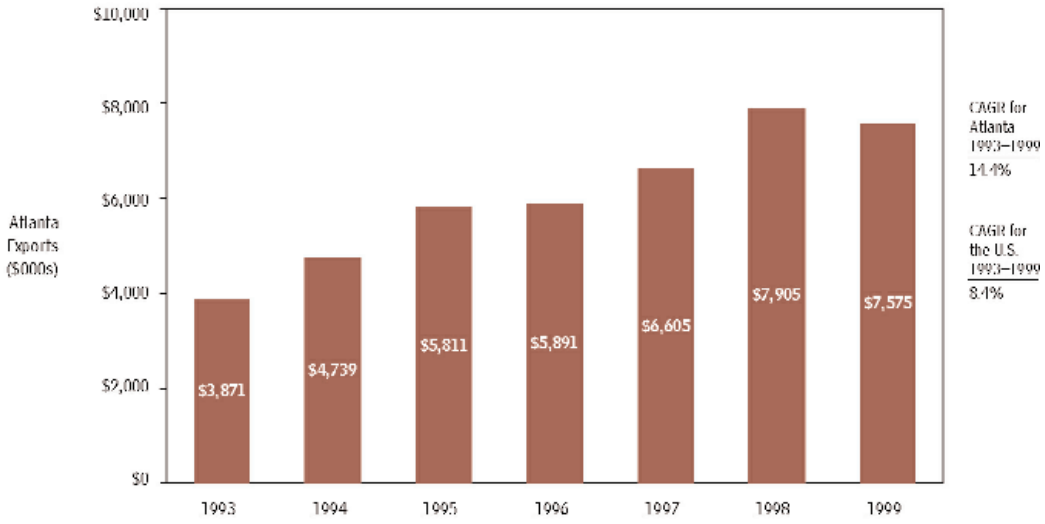
Exhibit 3: Average Wages in Select Geographic Areas



Note: Average wages are nominal
Source: Cluster Mapping Project, Institute for Strategy & Competitiveness, Harvard Business School

- **Cost of living.** The cost of living in Atlanta is an estimated 10 to 20% higher than the national average. In 2000, executive housing near downtown cost an estimated 65% higher than the national average.
- **Exports.** From 1993 to 1999, the Atlanta region doubled its exports from $3.8 to $7.6 billion (see Exhibit 4). However, Atlanta's $3,432 exports per worker in 1999 trails the national average of $5,212 per worker, as well as benchmark regions like Austin ($6,969), Boston ($5,734), and San Jose ($29,347).

Exhibit 4: Atlanta Regional Export Growth, 1993-1999



Source: U.S. Department of Commerce, International Trade Administration

Innovative Capacity Indicators

- **Patents.** Atlanta's rate of 4.7 patents per 10,000 workers is below the national rate of 6.3 per 10,000 workers, and well below competitor regions like Boston (20.9 per 10,000) and Austin (22.2 per 10,000). Atlanta's annual patent growth of 9.5% from 1993 to1999, however, was well above the national average, and was eighth fastest among the nation's 20 largest metro areas.
- **Venture capital investments.** In 2000, venture capital funding per worker in Atlanta ($695/employee) was close to 2.5 times the national average. However, many competing technology regions received higher funding on a per capita basis.
- **Establishments.** Establishments in traded clusters grew at 9.0% annually between 1990 and 1999, a rate four times faster than the national average. These strong numbers are somewhat skewed by the rapid population growth, which also drives up establishment creation.
- **Fast growth firms.** Over the past decade, Atlanta has consistently outperformed other regions in placing firms on Inc. Magazine's list of the 500 fastest growing companies in the nation. According to the National Council on Entrepreneurship's Growth Company Index, Atlanta was fourth in the nation in terms of its concentration of high employment growth firms.
- **Initial public offerings.** Fifty Atlanta regional companies went public from 1996 to 1999, more than their competition in Austin, but behind leading regions like Boston, which had 106 IPOs, and Washington, D.C. , which had 64.

Exhibit 5: Summary of Economic Performance and Innovation Output in Atlanta

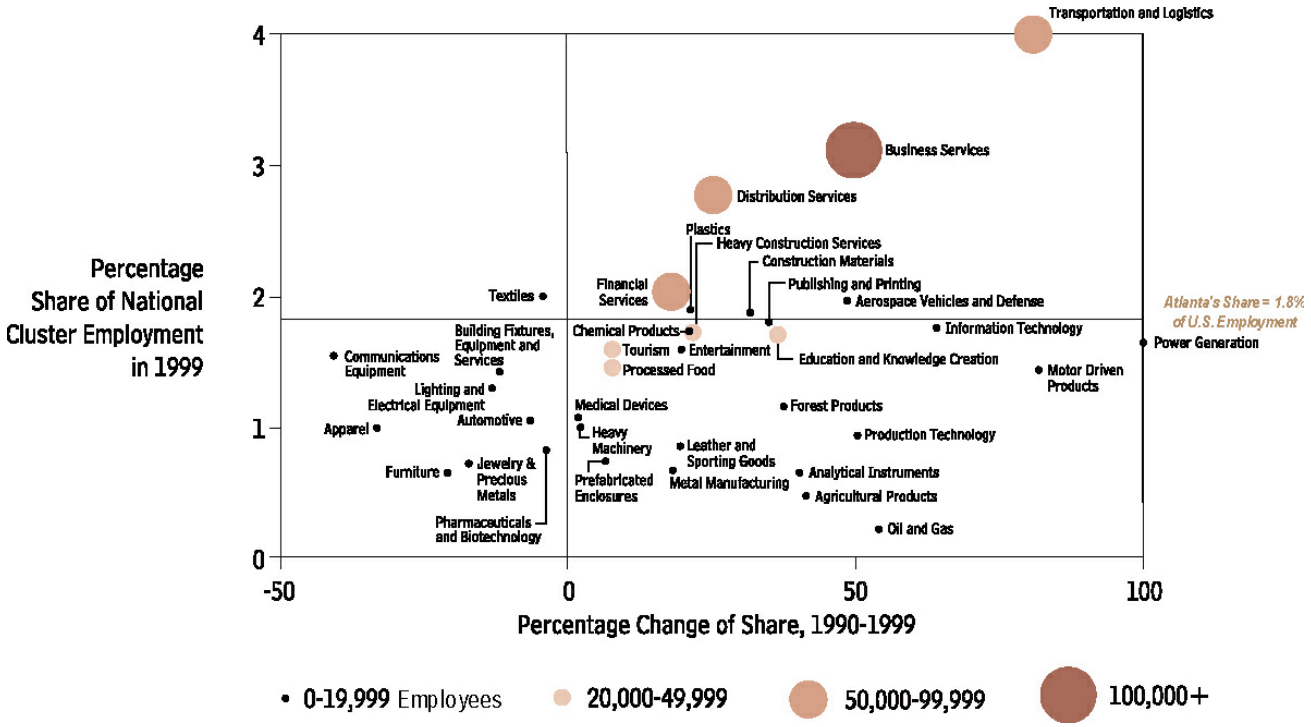
Source: Bureau of Labor Statistics, Bureau of Economic Analysis; International Trade Administration; U.S. Patent and Trademark Office; Price Waterhouse Cooper Money Tree; Hoover's IPO Central; Inc. Magazine; Fast Forward, Inc., Baker Thompson Associates

Composition of the Atlanta Regional Economy

- **Traded industry versus local industry employment.** In 1999, 32.0 % of Atlanta regional employment was in traded clusters such as communications, education and knowledge creation, and information technology, while 67.4 % of Atlanta's employment was in local clusters such as personal services, local construction, and real estate development. These levels are equivalent to the national average.

  As traded clusters generally pay higher wages, it is important to track changes in the percentage of people employed in traded clusters over time. Employment in traded clusters as a percentage of total employment declined slightly during the early to mid 1990s during the economic downturn, but recovered by 1998 to reach 1990 levels.
- **Strong positions in numerous clusters.** Atlanta enjoys strong positions in numerous clusters including transportation and logistics, business services, distribution services, financial services, information technology, education and knowledge creation, publishing and printing, and heavy construction. Fifty-two percent of Atlanta's traded-cluster employment is in clusters relatively stronger and growing more rapidly than the U.S. average. These clusters are identified in the upper right quadrant of Exhibit 6 on the next page.

Exhibit 6: Atlanta's Traded Cluster Share of National Employment and Employment Growth



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Assessment of Overall Competitiveness and Innovative Capacity

- **Strong air transportation and communications infrastructure.** Hartsfield Airport in Atlanta is one of the world's largest, and is an economic engine that directly supports airlines, cargo carriers, and logistics firms. It is also a significant asset in attracting a broad range of international companies to the region. The region's communications infrastructure, recently updated for the 1996 Olympics, provides a strong base for telecommunications, Internet, and all firms that rely upon fast and reliable data transfer.
- **Attractive quality of life**. Atlanta's location near the recreational assets of the eastern seaboard, but far enough south to provide warm weather year-round, makes the region attractive to many families. The metro area offers a wide variety of neighborhoods, nearby outdoor activities, and national-quality cultural amenities that attract professionals and highly skilled labor to the region.
- **Strong higher educational system.** Atlanta is home to two leading national universities, Georgia Tech and Emory, as well as a number of highly respected smaller institutions like Morehouse College, Spellman College, and Georgia State University. In addition, the state-lottery funded Hope Scholarship program provides strong financial incentives for talented Georgia students to attend college in the state.

- **Highly skilled work force.** These Atlanta institutions attract a large pool of talented professors, students, and skilled labor to the region. The state has also developed the Intellectual Capital Partnership Program (ICAPP) that focuses on creating specialized training programs aimed at ensuring that Georgia-based firms have access to a skilled workforce in their industry.
- **Strong state government support for technology development.** The State of Georgia has a long history of supporting university-based science and technology development. In 1960, the state created the Industrial Extension Service to promote industrial technology transfer. In 1980, the state-supported business incubator, the Advanced Technology Development Center, was established at Georgia Tech. Both programs have since grown and others have been implemented. Every governor since Governor Griffin in 1956 has made science-based development a significant component of the state's economic development plan.[1]
- **Deep university-business-government collaboration.** In recent years, public and private sector leaders have worked together to create innovative collaborative programs like the Georgia Research Alliance and the Yamacraw Project. These initiatives are funded by government and business, implemented through universities, and directed by board members from all three sectors.
- **Strong regional chamber of commerce.** The Metro Atlanta Chamber of Commerce has played an important and successful role in attracting companies to the region. It has invested significant efforts in developing the international image of the region and fostering collaboration on major regional economic development initiatives.
- **Openness to newcomers and diversity.** The Atlanta business environment accepts newcomers into its ranks of leaders based on contributions, not family ties, social status or race. Atlanta is among the few American cities with a large and established black middle class. New ideas are welcome from all quarters.
- **Sense of regional pride and self-confidence.** In Atlanta, most business and government leaders maintain a belief that the region can succeed in any effort, so long as they try hard enough. In both social challenges like race relations and international competitions like that to host the Olympics, Atlanta leaders always believe that they can find a winning solution. This regional sense of confidence extends to business development as well.

Challenges

While fundamentally strong and now more diverse than ever, the Atlanta economy faces some difficult challenges, many of which are the consequence of this success. Some of these challenges, like poor air quality, constitute immediate threats to further development. Throughout the regional economy, a recent pattern of high employment growth, moderate wage growth, and low patenting has emerged. Over the long term, continued low patenting may stunt employment growth and the opportunity to spur faster increases in wages.

- **Strain on the physical infrastructure.** Rapid economic and population growth has put a strain on the region's physical infrastructure. Traffic jams in Atlanta have earned national renown—and contribute to air pollution that has already led the federal government to suspend federal highway funds once. In some areas of the region, notably the Buckhead area in North Atlanta, new commercial construction often faces delays due to inadequate sewer capacity. These infrastructure weaknesses raise citizens' cost of doing business relative to the wages paid.
- **Rising cost of living.** Atlanta has traditionally used its low cost of labor and living expenses as a business attraction tool. The success of the region has driven up local costs, creating challenges for lower income residents and forcing Atlanta to compete based on non-financial advantages to attract and maintain firms.
- **Uneven K-12 educational system.** Young Atlantans can receive an excellent primary and secondary school education. However, many do not because of the uneven quality of K-12 education. Like the transportation infrastructure, the educational infrastructure of the region has not been able to keep up with the population growth.
- **Concerns about the future supply of scientists, engineers, and skilled labor.** The rapid growth of the Atlanta economy over the past decade is leading to the possibility that the region will be unable to replenish its pool of scientists, engineers, and skilled technicians. Only 34% of the regional leaders we surveyed felt that the region had a pool of trained workers sufficient to meet growth needs.
- **Weak patenting performance.** Although Atlanta innovators have been increasing their patenting performance, Atlanta still trails leading regions in its innovation output. The development and commercialization of unique and proprietary technology will provide a stronger foundation for future growth.
- **Need for improved technology transfer from universities.** Despite the development of numerous patented discoveries at local universities, the process of transferring technology from the universities has been described as slow and cumbersome.
- **Poor regional government coordination.** In addition to the City of Atlanta and scores of other towns, the Metro Atlanta area has 20 counties, each with its own county government. While there is a regional government council, the Atlanta Regional Commission, the county governments still exert great independence in decisions around construction, zoning, and taxation. The traffic congestion and air pollution problems have arisen in part because of the lack of coordinated regional action.

ASSESSMENT OF SELECT CLUSTERS

Like the overall regional economy, the clusters we studied in Atlanta tend to have enjoyed strong employment growth, but moderate wages and relatively low patenting rates. This raises concerns about future prosperity. Sustaining high levels of innovation is necessary for long-term gains in productivity and competitiveness. Improving the innovative capacity of clusters should be a prime focus of future economic development strategies.

THE FINANCIAL SERVICES CLUSTER

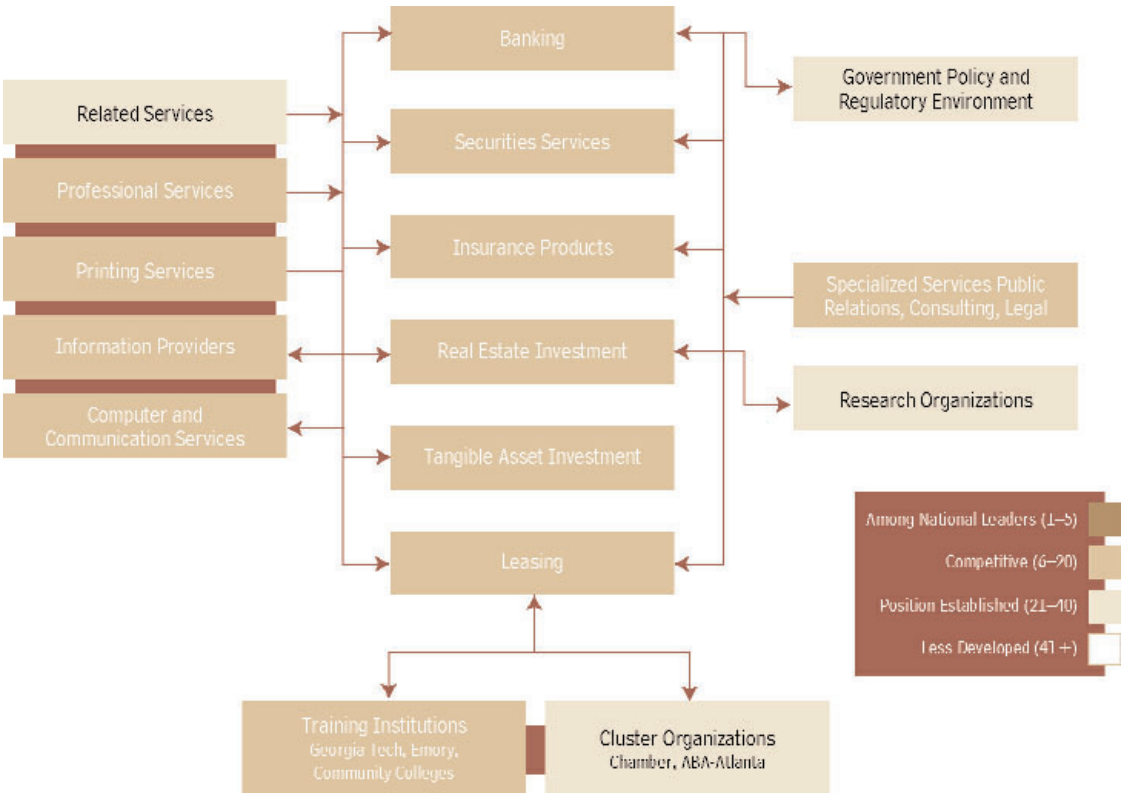
Economic Performance

- **Employment.** In 1999, the Atlanta metropolitan statistical area (MSA) had the eighth largest financial services cluster in the country, and the second fastest growing out of the 20 largest clusters in the United States. More than 8,000 new financial services jobs were added over the decade.
- **Wages.** Average wages paid in the Atlanta cluster rank 15th among the largest 20 clusters, and have been increasing at more than 7% a year in the 1990s. This growth has helped Atlanta's financial service workers gain on their counterparts in most other regions, though the average wage of $63,300 is significantly below leaders like New York and San Francisco where average salaries top $110,000.
- **Patent registration.** Out of the 20 largest financial services clusters in the country, Atlanta ranks 15th in patents per employee, and fourth in annual growth of patenting.

Composition

- The Atlanta financial services cluster is well represented across the various subclusters; all of the core subclusters have employment greater than the Atlanta average share of national employment (see Exhibit 7). However, in some specialized industry segments like investment banking and venture capital firms, the region lacks a major presence.
- Once the home of many bank headquarters, Atlanta no longer is headquarters for a leading national bank. However, the cluster has continued to grow through the establishment of major regional bank operations and strong development of real estate, insurance, and financial planning services. It is also home to the Southeast Regional Federal Reserve Bank.
- Atlanta firms have been leaders in developing Internet banking services and financial clearing operations.

Exhibit 7: The Atlanta Financial Services Cluster



Source: Clusters of Innovation Initiative Regional Survey™; Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School and in-person Interviews

Competitiveness and Innovative Capacity

- Strengths
  - Leading real estate developers and lenders
  - Regional operations of many major U.S. and international banks
  - Strong rivalry among local financial institutions
  - Strong local presence in most subclusters
  - Strong "back-office" infrastructure in nearby Columbus
  - Growing venture capital and angel investor community
  - Increasingly sophisticated local demand for banking products and services
- Challenges
  - Lack of major national bank corporate offices
  - Little presence in sophisticated and high wage financial service segments like investment banking and asset management
  - Reputation for financial innovation limited to a few sectors: web-banking and ATM adoption
  - Sporadic cooperation among local firms on technology development and cluster improvement.

THE TRANSPORTATION AND LOGISTICS CLUSTER

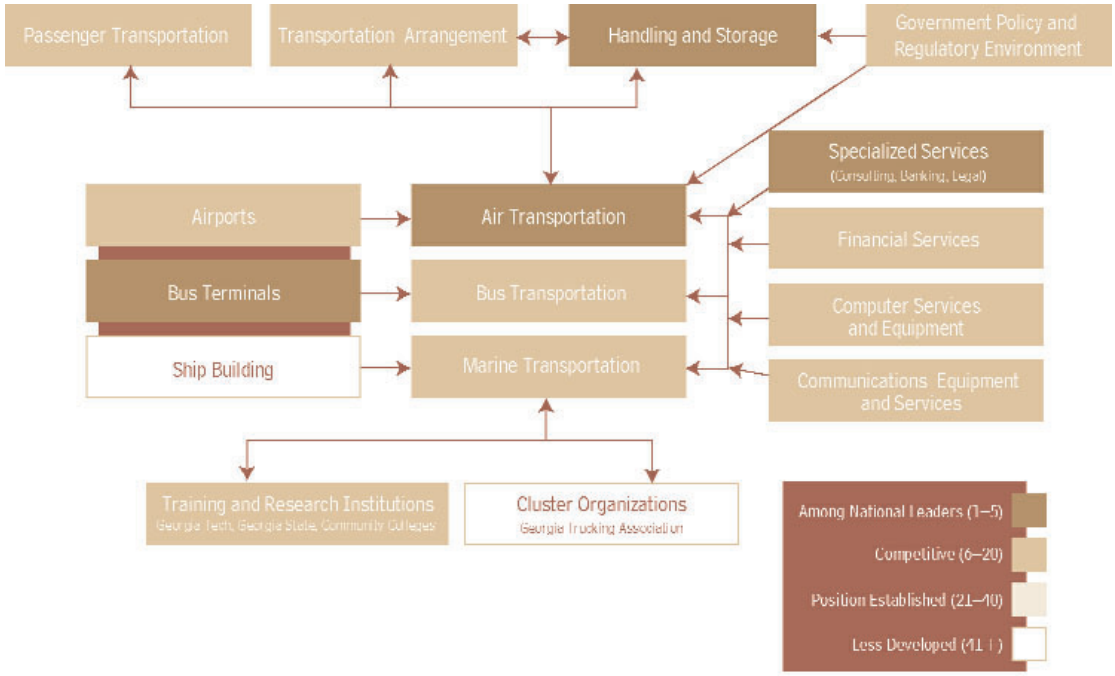
Economic Performance

- **Employment.** In 1999, the Atlanta MSA had the fifth largest transportation and logistics cluster in the country, and the second fastest growing out of the 20 largest clusters in the United States. Close to 50,000 new transportation and logistics jobs were added in the region between 1990 and 1999.
- **Wages.** Atlanta transportation and logistics firms paid the seventh highest average wage of the largest 20 national clusters, better than the relative position of Atlanta's financial services cluster. Wages have been increasing at more than seven percent a year in the 1990s and averaged nearly $57,000 in 1999. This rate placed the cluster seventh among the largest 20 regional clusters.
- **Patent Registration.** Out of the 20 largest transportation and logistics clusters in the country, however, Atlanta ranks 18th in patents per employee.

Composition

- The Atlanta transportation and logistics cluster has its hub at Hartsfield Airport, where Delta Air Lines is the main tenant. Air transportation is the largest employer in the cluster.
- Building on its historical roots, Atlanta continues to have a strong warehousing and distribution sector that has grown significantly with the growth of the Southeast.
- Atlanta offers a strong set of support services for transportation and logistics firms—including specialized consulting, software, and legal services. The Logistics Institute at Georgia Tech is a nationally recognized research center (see Exhibit 8).

Exhibit 8: The Atlanta Transportation and Logistics Cluster



Source: Clusters of Innovation Initiative Regional Survey; Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School and in-person Interviews

Competitiveness and Innovative Capacity

- Strengths
  - Hartsfield Airport facilities
  - Delta Air Lines hub
  - United Parcel Service headquarters
  - Excellent location as transit point to the Southeast and Northeast United States
  - Significant local demand for external goods makes outbound truck/rail service inexpensive
  - Relatively thick labor market for transportation and logistics professionals
  - Georgia Tech Logistics Institute
- Challenges
  - Regional growth has created traffic problems for road-based transportation companies
  - Air traffic delays at Hartsfield create challenges for local passenger and cargo carriers
  - Increased competition (and price) for skilled labor in the region puts many trucking firms at a cost-disadvantage
  - There is a lack of strong regional industry associations, as well as little cooperation between large and small players in the cluster.

THE INFORMATION TECHNOLOGY CLUSTER

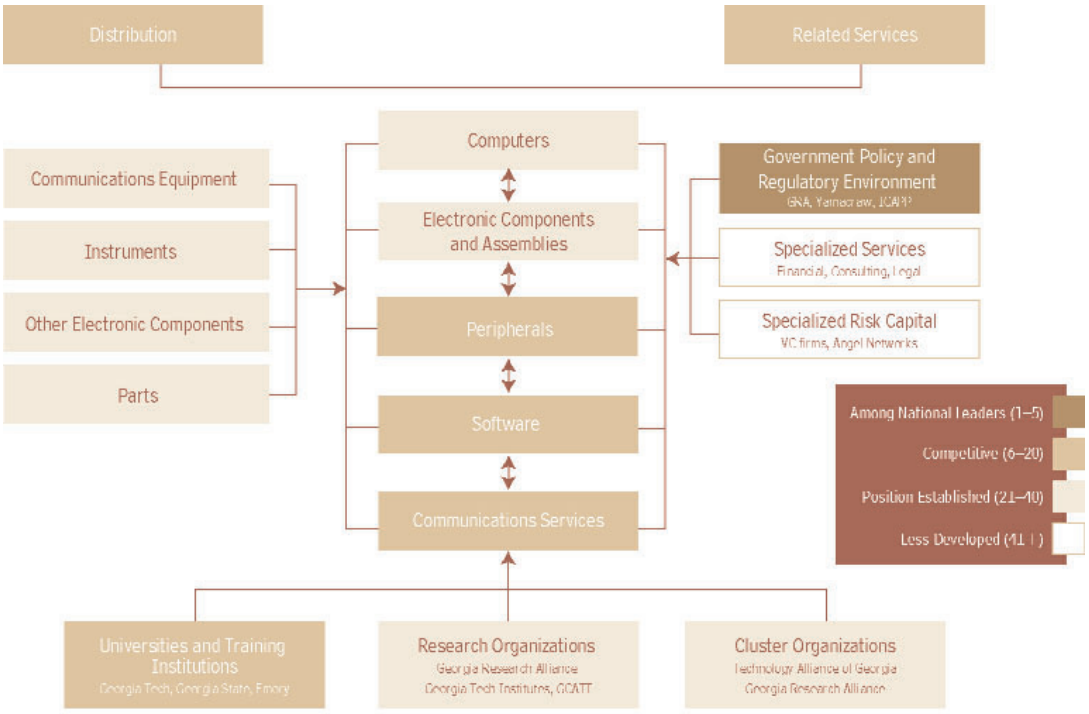
Economic Performance

- **Employment.** The Atlanta information technology (IT) cluster is the ninth largest in the United States, and is the second fastest growing, among the United States' 20 largest clusters. In 1999, it employed more than 60,000 people in the region, compared to only 28,000 in 1990.
- **Wages.** Wages paid in the Atlanta cluster rank tenth among the largest 20 IT clusters, and have been increasing at more than 5% a year in the 1990s. However, other regional information technology clusters have seen significantly higher wage growth, placing Atlanta in a weaker relative position than in 1990.
- **Patent registration.** Despite some improvement over the decade, the Atlanta IT cluster trails the leading U.S. IT regions in patent registration. In 1998, Atlanta ranked 18th of the top 20 regions in patents per employee.

Composition

- The Atlanta cluster has strength in communications services, software development, computer distribution, and related services (see Exhibit 9).

Exhibit 9: Atlanta Information Technology Cluster



Source: Clusters of Innovation Initiative Regional Survey; Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School and in-person Interviews

- The cluster has established national leading firms in the Internet service provision and web development industries as well as a number of leading web vendors in the travel and financial services areas. Established firms like IBM and BellSouth have been leaders in developing and integrating information technology services into their product offerings.
- The Atlanta cluster does relatively little in the way of computer and electronic parts manufacturing and is not known for having particularly innovative support services for the cluster.

Competitiveness and Innovative Capacity

- Strengths
  - Established large technology companies (BellSouth, Cox Communications, IBM, Scientific Atlanta)
  - Georgia Tech Information Technology programs, researchers, and alumni network
  - Relatively large pool of scientists and skilled technicians
  - Technology Alliance of Georgia
  - State government programs that support technology-based economic development at regional universities
  - Good quality of life

- Challenges
  - Lack of patenting
  - Lack of national recognition as an information technology hub
  - Relative weakness in important subclusters like computers and components
  - Recent financial troubles of leading Internet firms and web developers
  - Need for more effective university technology transfer offices

SUSTAINING COMPETITIVE ADVANTAGE: LESSONS, CHALLENGES, AND OPPORTUNITIES

Atlanta's leaders have accomplished much since the city hosted the 1895 International Cotton Exposition. Then an agricultural center and Georgia rail transport hub, the region became the leading business and commerce center in the Southeast by the 1970s. As its population grew and businesses diversified, the region grew into a national center based on established companies like AT&T (BellSouth), Coca Cola, Georgia Power, Georgia Southern, and Norfolk Southern. In the past decade, the region has become an international business center due to the global expansion of its large firms, the attraction of foreign firms, the strong growth of Delta Air Lines and other firms centered around Hartsfield Airport, the emergence of scores of smaller leading-edge technology firms, and major collaborative efforts by university, business, and government leaders. Hosting the Olympics in 1996 put Atlanta on the international map for a wider array of individuals and companies, and also led to the installation of a communications infrastructure that will aid industrial development for years to come.

Lessons

Atlanta's regional economic growth has been shaped by a series of major influences that have persisted for many decades. The process by which the Atlanta community established its competitive strength provides lessons for other regions.

Build from Strength

Atlanta was born of the railroad. Atlanta's leaders recognized the transportation sector's importance and invested heavily to establish the region as the leading gateway to the Southeast. In addition, leaders consciously encouraged related economic sectors — including financial services and warehousing — to develop around the railroad. Community leaders later spearheaded a series of economic development efforts to move Atlanta from a transport center, to a regional manufacturing center, to a home for corporate headquarters. Modern-day Atlanta benefits from a wide economic base, and its traditional clusters like financial services, communications, and transportation and logistics continue to generate development in related fields like software and consulting services.

Drive for an International Position

Since the city's inception, Atlanta's leaders have sought to make the area a world player. From the 1895 International Cotton Exposition to the 1996 Olympics, the desire to internationalize has shaped major economic development programs as well as the business decisions of the region's executives. The internationalization process eventually seeded itself. As Atlanta attracted major U.S. corporate headquarters, their efforts to expand internationally helped the region attract foreign corporations.

Private Sector Innovation and Initiative

Going back to the successful effort to relocate the state capital from Milledgeville to Atlanta, most of the major economic development efforts undertaken in Atlanta have been conceived by private sector leaders who then were able to develop political and community support for them. Recent initiatives like the Yamacraw Project and the Olympics have followed this pattern.

In Atlanta, private-sector-led economic development initiatives that mobilize government action have had a greater chance of long-term success than do government-generated initiatives. Having private sector leadership support up-front typically translates into a greater likelihood of government approval and faster project implementation.

State Government Activism

Georgia governors enjoy a strong set of executive powers. Since the 1970s, the state government, led by activist governors, has been a champion of technology and skill based development. Governors have spearheaded a succession of well-funded initiatives to strengthen the science and technology infrastructure in the Atlanta region. In addition, state funds for higher education institutions and for scholarships for Georgia students have helped increase the quality of post-secondary education. Due to Atlanta's high concentration of higher education institutions, it has gained a large share of state development investment.

Business-Government-University Collaboration

Particularly in recent years, university, public, and private sector leaders have worked together to create innovative collaborative programs like the ICAPP workforce training initiative and the Georgia Research Alliance. A common pattern has emerged in which private sector leaders convince a governor to support technology-based economic development programs that are then implemented through universities. The level of collaboration between and among the three sectors distinguishes Atlanta from many other regions. The willingness of competing public universities (Georgia and Georgia Tech) to join with private institutions in a research alliance is particularly notable.

Entrepreneurial Environment

Atlanta has developed cultural norms that are supportive of individuals who have big ideas. Thanks to a pro-business regulatory regime and an emerging record of venture success, entrepreneurs find Atlanta to be a fertile ground for major new projects and ideas. In the Southeast, Atlanta is viewed by most business people as the leading center for entrepreneurship. Young college graduates, in particular, are drawn to Atlanta over other major cities in the region.

Civic Pride

Atlantans, and particularly Atlantans in leadership positions, feel a strong compulsion to show their community in the most positive light. Many of Atlanta's most successful leaders have been superb marketers of the region, both internally and externally. The community has developed an attitude that it can do whatever it sets out to achieve. As one interviewee said, "Atlanta has self-fulfilling prosperity." The civic pride encompasses both natives and transplants. In Atlanta, there seems to be an expectation that once one has obtained political or commercial success, one should focus some time and effort on improving regional problems.

Challenges

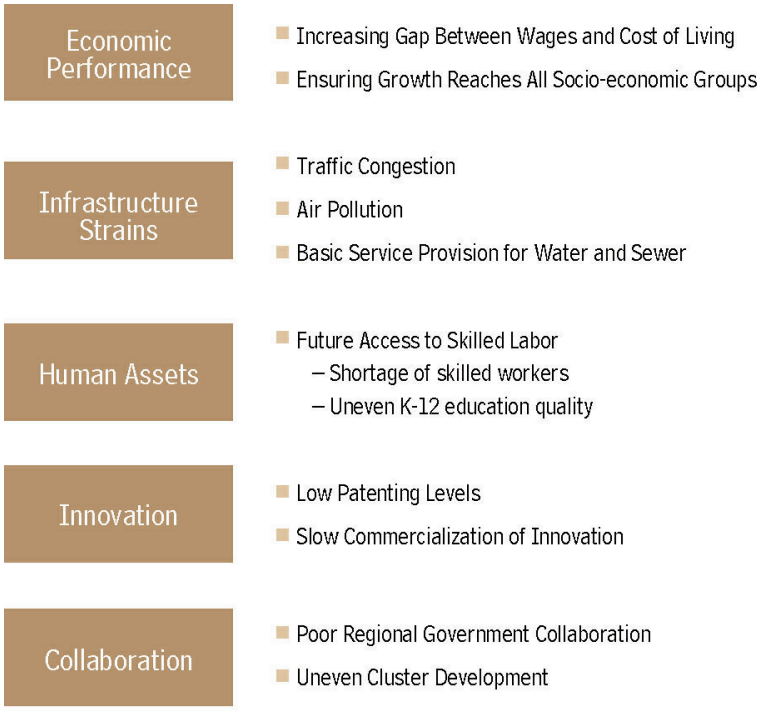
Atlanta has succeeded at buoyant growth, but faces the next challenge of translating this growth into broad-based prosperity relative to other advanced regions (see Exhibit 10). The population and commercial growth of Atlanta has created a variety of interrelated problems that the region must address to maintain its success, much less extend it. The transportation, water, and educational infrastructure are strained. Sprawling, unplanned regional growth has created traffic and land use challenges. A developing shortage of skilled human capital is a limitation to future growth. There is a growing gap between the cost of living and average salary levels. Despite strong success overall, there is still a significant issue around the unequal distribution of that wealth.

To resolve most of these issues, Atlanta will need to extend its strategy and make it a truly regional solution—one that can encompass leaders from all governmental bodies in the metro area. To date, Atlanta's regional institutions and its business culture are not configured to produce coordinated solutions.

Economic Performance

Increasing Gap between Wages and Cost of Living. The cost of living has been increasing faster than wage levels in Atlanta over the past decade. For lower skilled Atlanta workers, average wages in 2000 were close to the national average, but the cost of basic living needs was approximately 20% greater than the national average. For highly skilled workers, the gap between income and cost of living is smaller. Atlanta's traditional recruitment advantage of offering a relatively low cost of living has eroded over the decade.

Exhibit 10: Atlanta's Challenges



Ensuring Growth Reaches All Socio-economic Groups. U.S. Housing and Urban Development data shows poverty increasing slightly in the metropolitan statistical area (MSA) as a whole and in the central city from 1989 to 1997, while U.S. poverty rates stayed stable. Atlanta, like most U.S. regions, faces the challenge of ensuring that all of its residents have the opportunity to share in wealth creation. This challenge is not new, but has been exacerbated by the increasing distance between poor and rich over the last decade.

Infrastructure Strains

Traffic Congestion and Air Pollution. Rapid economic and population growth has put a strain on the region's physical infrastructure. Traffic jams in Atlanta have earned national renown— and contribute to dangerous air pollution levels. While the Georgia Regional Transportation Authority has developed an authorized plan to improve mass transit and reduce pollution, actually implementing the plan across such a large and diverse set of jurisdictions will be difficult.

Basic Service Provision for Water and Sewer. Infrastructure issues go beyond mass transit. Some areas of the region face restrictions in construction due to inadequate sewer capacity. The entire region faces a water shortage if growth continues at present levels. The Metro Chamber, the state, and others led the effort to develop a regional water authority. While this is an important accomplishment, the work to ensure future water supplies is far from complete.

Human Assets

Future Access to Skilled Labor. The rapid growth of the Atlanta economy over the past decade, as well as the degrading quality of life, has led to the possibility that the region will be unable to replenish its pool of scientists, engineers, and skilled technicians. Only 34% of the regional leaders we surveyed felt that the region had a pool of trained workers sufficient to meet growth needs.

Uneven K-12 Educational System. This problem is compounded by the uneven quality of K-12 education in the region. Many executives interviewed expressed general concern about the quality of education and their personal views that they would only send their children to private schools. The future ability of Atlanta to support innovative firms in all sectors is partially dependent upon the region's ability to create a steady supply of capable high school graduates.

Innovation

Low Patenting Levels. Although Atlanta innovators have been increasing patenting output, in most industries, Atlanta still substantially trails leading regions in its innovation output. While patenting is not the only measure of innovation, patents are a tangible representation of new ideas and potential products. The more rapid development and commercialization of unique and proprietary technology will be necessary to provide a foundation for Atlanta's future prosperity.

Slow Commercialization of Innovation. Despite the development of technology at local universities, the process of transferring technology from the academic institutions has been described as slow and cumbersome. Efforts are underway through the Georgia Board of Regents and the Georgia Research Alliance to improve the commercialization of research at universities in the state. However, the Atlanta region will have to mount an overall effort to improve commercialization.

Collaboration

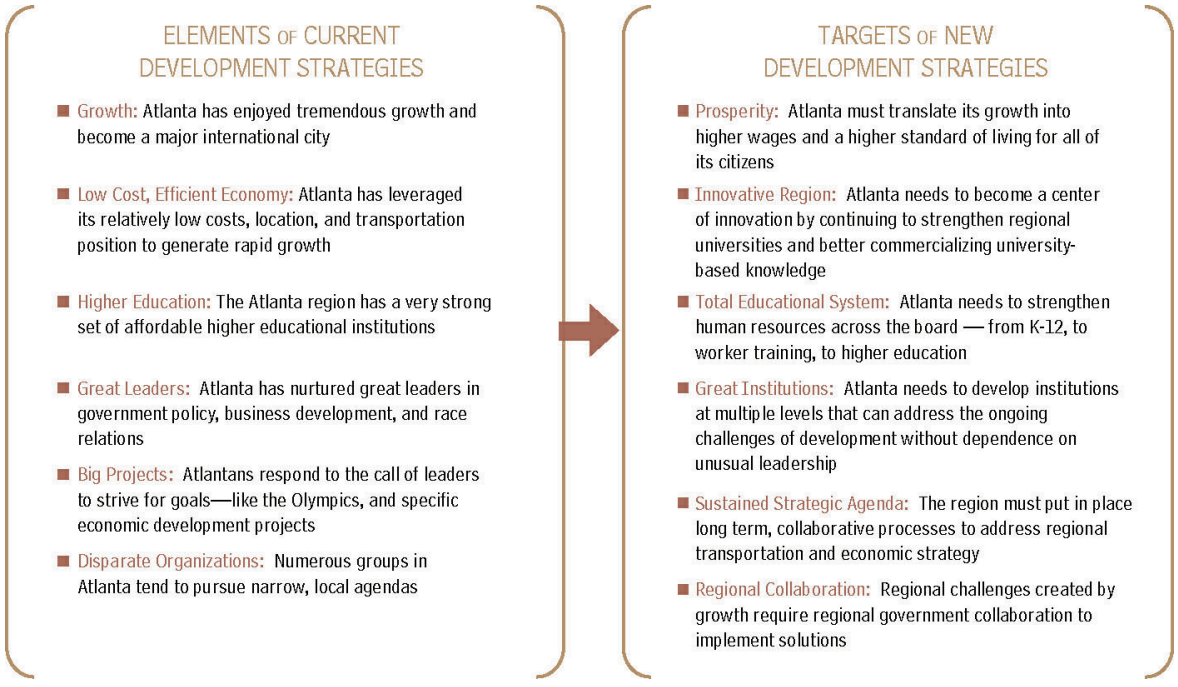
Poor Regional Government Coordination. In addition to the City of Atlanta and dozens of other cities, the Metro Atlanta area has 20 counties, each with its own government leadership. While there is a regional body, the Atlanta Regional Commission, county governments still exert great independence in decisions around construction, zoning, and taxation. The traffic congestion and air pollution problems have arisen in part because of the lack of coordinated regional action. The solutions to these problems, along with the work to improve the overall infrastructure, will absolutely require coordinated regional efforts.

Uneven Cluster Development. Atlanta has a strong overall regional collaborative institution, such as the Metro Chamber. However, cluster development thinking and cluster-specific institutions for collaboration are lacking. In both the transportation and logistics and financial services clusters, for example, executives believed their institutions could play a more proactive role in spurring collaboration and marketing the cluster.

New Directions

Atlanta has become a highly competitive region, but its very success has created a host of challenges to future prosperity and created the need to move beyond traditional strategies. To remain competitive and address the issues required to maintain an improving regional standard of living, the focus of economic development efforts should be modified and broadened. New strategic directions are needed (see Exhibit 11).

Exhibit 11: Atlanta's Economic Vision: New Directions



From Growth to Prosperity. Atlanta has enjoyed tremendous economic growth over the past century, and particularly over the last decade, creating more jobs than any other major metro area in America. However, its growth has also led to strains– pollution, traffic, and a rising cost of living, to name a few, that pose threats to the prosperity of its residents. Furthermore, all residents have not shared the wealth created over the last decade. The average wage paid in Atlanta has not kept pace with increases in the cost of living. Poverty is still a very real aspect of the Atlanta region that must be addressed.

From Low Cost, Efficient Economy to Innovative Region. Historically, Atlanta has leveraged its relatively low costs, privileged location, and attractive climate to generate economic development. This traditional approach is losing its relevance. With regional costs increasing and the challenge of success increasingly tied to productivity growth, Atlanta needs to become a center of innovation by continuing to strengthen regional universities, better commercializing university-based knowledge, and attracting private sector research efforts. Accomplishing this shift will require a change in the traditional economic development mindset of many regional leaders.

From Higher Education to Total Educational System. Atlanta has a strong set of higher educational institutions, but its secondary school system needs improvement. Too many of Atlanta's youth, the building blocks of future generations of business leaders, scientists, and professors, are not getting the education they need. The challenge is to maintain high standards in higher education while preparing more local young people to meet those standards.

From Great Leaders to Great Institutions. Atlanta has prospered thanks to the direction provided by great leaders. Ivan Allen led the move to develop a southeastern hub for business. Martin Luther King Jr. led Atlanta through the tumultuous desegregation process. Billy Payne brought home the Olympics. In the process of attaining these accomplishments, these leaders mobilized large numbers of people to support their cause. However, their legacy typically did not lead to the institutionalization of these groups into ongoing organizations. The challenge for Atlanta is to develop institutions that can address the ongoing challenges of development without relying upon the unusual gifts of leaders, who will have a difficult time driving progress as the size and diversity of the region grows.

From Major Projects to a Sustained Strategic Agenda. Atlanta has a history of successful projects. These range from building Hartsfield Airport to hosting the Olympics. The local culture and government policies that support business and social entrepreneurship have helped Atlanta grow. However, this explosive and largely unplanned growth has led to serious challenges. Addressing these issues, particularly around infrastructure, will require more than a one-time effort. It will require the development of long term, collaborative processes to address regional transportation, environmental, and other needs.

From Disparate Organizations to Regional Collaboration. Individual government and civic institutions in Atlanta have attempted to craft responses to social and economic problems in the region. However, concerted regional efforts are rare because of the strained relationships between local and regional government institutions. Increased local government collaboration and sustained business involvement are necessary to address long-term infrastructure and educational issues.

Opportunities

Atlanta leaders should consider a new economic development vision. By doing so, the region will be better able to take advantage of the opportunities that exist for increased prosperity. By increasing innovative capacity, assisting both established and emerging clusters, and expanding the geographic scope of development efforts, the region stands to ensure a prosperous future (see Exhibit 12).

Increase Innovative Capacity

Unlock the Commercial Potential in Universities

While the Georgia Research Alliance has done an excellent job in supporting innovative research and the development of strong academic programs, the patenting output of its member institutions has not kept pace with national competitors. There is also a need for increased emphasis on the commercialization of the innovations that do emanate from regional universities. Efforts are underway to improve the communication and processes of tech transfer institutions. They should be fully supported.

Attract Additional Non-university Research Institutions

With its numerous colleges and universities, expertise in many fields of study, and attractive quality of life, Atlanta is a good place for private and non-profit research centers to locate. Few presently exist. Such research centers are not only valuable in their own right as centers of innovation and training, but also address two of Atlanta 's critical needs: idea generation and technology transfer.

Focus on Technology in Addressing the Environmental, Traffic Management, and Logistics Issues - Key Areas that Challenge Quality of Life

Atlanta faces some of the most serious air pollution and traffic problems in the country. However, it is also home to top-notch engineering and scientific research, a transportation and logistics research center, and leading firms in related technology fields. Atlanta has the opportunity to address the challenges of pollution and traffic as the next big community effort.

Exhibit 12: Atlanta's Opportunities

Upgrade and Leverage Existing Clusters

Develop Stronger University Ties to Emerging and Established Clusters

Business and university leaders work to link assets within local universities to companies in emerging and established clusters. Although universities can be a source for the creation of new clusters, this takes many years, and it is difficult to predict what those clusters will be. More immediate benefits can be realized by building on areas of existing strengths, such as identifiable emerging and established sectors like communications, consumer goods, and tourism/entertainment.

Identify and Pursue Additional Cluster Opportunities at the Intersection of Clusters

Atlanta has already seen success where strong clusters come together, notably in financial services and information technology. Opportunities may exist in defense-related information technology and innovative food processing, particularly given the nation's new military requirements. As a region, Atlanta can do more to foster cross-cluster collaboration by hosting networking events designed to foster this kind of interaction.

Expand Geographic Focus

Continue to Develop International Ties, with Special Focus on Opportunities in Latin America

Atlanta has a long history of seeking international commercial relationships and has enjoyed impressive success in attracting both European and Asian firms to locate headquarters in the region. Latin America represents the natural opportunity for expansion of international ties, and some Atlanta leaders have recognized it as the next frontier for the region. Atlanta is well positioned to take advantage of the growing U.S.-Latin American logistics market and to compete for U.S. headquarters of Latin American companies.

Key Challenges and Opportunities for Columbus

The Columbus region has outperformed the national economy over the past decade in job creation and wage growth. Led by major employers like Synovus, American Family Life Assurance Company (AFLAC), and Columbus Regional Healthcare, the economy was able to produce close to 20,000 new jobs over the period.

However, despite the increases over the period, average wages for Columbus in 1999 were only $25,430, or 79% of the national average. This relatively low wage level and the draw of larger communities like Atlanta have made it hard for Columbus to retain its talent pool, despite an attractive climate and relaxed quality of life.

Columbus has benefited greatly from the headquarters of two international financial service companies: Synovus, a financial service holding company which owns a world-leading electronic payment processor, and AFLAC, a leading supplemental insurance company. These two companies employ close to 10% of the total regional private sector workforce and are major contributors to civic and economic development efforts. Along with Fort Benning, a major Army base, these organizations anchor the regional economy.

While Synovus and AFLAC have been individually successful, their success has not yet led to the development of a broad financial services cluster in Columbus with its own national reputation. A few financial service suppliers and complementary businesses, like credit card issuing institutions, have been established in the region, but their numbers are limited. Synovus employees have generated a few spin-offs, but new jobs created for the Columbus region have been modest.

There is an opportunity for the companies and community to make a concerted effort to develop a technology-intensive financial services cluster. To accomplish this will likely require an explicit economic development plan to upgrade local institutions and foster both new start-ups and spin-offs of existing companies.

Columbus is well structured to address its economic development challenges. Its unified city-county government is a model for regional government collaboration within the state. The government has a strong relationship with the Chamber of Commerce and other local civic and educational institutions. These groups have a history of working closely together on past economic development initiatives. What is needed is a new strategy to take the region to the next level.

Key Assets

- Strong set of big financial service companies that anchor the economy – Synovus, AFLAC, Blue-Cross Blue Shield—and contribute to civic development
- Presence of Ft. Benning that drives retail growth and provides skilled workforce
- Presence of large labor pool with experience in computer programming
- Responsive local government that consolidates city/Muskogee County
- A proactive institution for collaboration (Columbus Chamber of Commerce)
- Attractive quality of life

Challenges

- Developing greater recognition for Columbus as a business location nationally and internationally
- Moving from a town with some big companies to a region with strong industry clusters
- Leveraging links to Atlanta without losing local identity

Opportunities

- Develop an explicit economic development strategy to build the region's financial services cluster around existing anchor firms
- Expand efforts to support entrepreneurial start-ups in the region; promote location of spin-outs of anchor firms in the region

INTRODUCTION

Why Innovation Matters

During the 1990s, Americans found a way to do what seemed no longer possible - grow the economy, create jobs, and increase the standard of living, without driving up inflation. Much of the credit goes to the nation's ability to develop and commercialize new technology. The result: one of the most robust periods of economic expansion and prosperity of the past century.

Today, the nation is experiencing an economic downturn. As business and government leaders wrestle with this new context, most of the attention has been focused on monetary stimulus through lower interest rates and fiscal stimulus through lower tax rates and government spending. These are important tools to affect economic growth in the short run. However, neither addresses the fundamental causes of prosperity. Prosperity depends upon the productivity with which the United States economy uses labor and capital to produce goods and services. Productivity rises because of innovation. Moreover, sustained economic growth will require continued innovation at all levels of the United States economy, especially as we enter a new era when the workforce will be increasing more slowly.

While fiscal and monetary policies pump dollars into the economy to boost the level of activity, innovation infuses the economy with growth-incubating new ideas, new products and services, and new technologies. National policies and national investment choices have much to do with the growth and capacity of the American economy. For innovation, however, the real locus is at the regional level. The vitality of the United States economy, then, depends on creating innovation and competitiveness within regions.

About the Clusters of Innovation Initiative

The Clusters of Innovation Initiative offers a new way of thinking about economies that has begun to take hold as communities across the nation confront the successes of California's Silicon Valley, Massachusetts' Route 128, Austin, Texas, and other areas. In healthy regions, competitiveness and innovation are concentrated in clusters, or groups of interrelated firms and industries in which regions specialize. The nation's ability to produce high-value products and services that support high-wage jobs depends on the creation and strengthening of these regional hubs of competitiveness and innovation.

The Clusters of Innovation Initiative was launched to help meet this challenge. Under the leadership of Professor Michael Porter, Harvard University; Duane Ackerman, BellSouth Corporation; and a national steering committee — and supported by a partnership of Monitor Group, ontheFRONTIER, the Institute for Strategy and Competitiveness at Harvard Business School, and the Council on Competitiveness — the Initiative has worked to understand how regional economies develop, how clusters form and gain or lose competitiveness, and how innovative capacity is built. It offers recommendations for government, universities, the private sector, and other regional institutions. It aims to inform key decision makers across the country and provide a methodology for analysis that any region can utilize.

The Initiative studied five regions around the country: Atlanta/Columbus, Pittsburgh, the Research Triangle, San Diego, and Wichita. These regions were selected to provide a diversity of size, geography, economic maturity, and perceived economic success. The regions were similar enough to allow interest-

ing comparisons, yet diverse enough to encompass a wide variety of challenges and opportunities in regional economic development.

Data for the study were drawn from a number of sources, but the principal sources of data were the Cluster Mapping Project of the Institute for Strategy and Competitiveness, the Clusters of Innovation Initiative Regional Surveys™, and in-depth interviews of business and government leaders in each region.

The Cluster Mapping Project is perhaps the most detailed data set related to economic composition and performance ever compiled. Comparing regional economies has historically been difficult because clusters have not been systematically defined and their incidence charted across all U.S. regions. The Cluster Mapping Project created a detailed statistical analysis using county-level business data, including detailed metrics on regional economic performance, and data defining 41 types of clusters that are found in regions throughout the United States economy. The Cluster Mapping Data also mapped regional economies by cluster and constituent industry and compared regions to others on various indicators of economic vitality and future competitiveness. One of the goals of the Cluster Mapping Project is to disseminate this data widely to practitioners. (To access the data over the Internet, go to www.isc.hbs.edu.)

Monitor Group, ontheFRONTIER, and staff from the Council on Competitiveness designed and implemented a far-reaching survey the Clusters of Innovation Initiative Regional Survey™ to study the business environment and cluster competitiveness in each region. More than 1,025 business and government leaders were surveyed and 264 in-depth interviews were conducted to determine the historical growth, recent performance, and composition of local economies. Fifteen clusters in the five regions were studied as well. In Atlanta-Columbus, 202 executives were surveyed, and another 43 were interviewed. (see Exhibit 13).

While many projects around the United States and elsewhere have studied one particular region or one particular cluster or groups of clusters, the Clusters of Innovation Initiative is unique in its coverage of five regions and 15 individual clusters using a common methodology, individually and comparatively. The Cluster Mapping Data, surveys, and interviews provide a unique information resource for these regions and the nation as a whole.

Exhibit 13: Regions, Clusters, and Unique Data

Atlanta-Columbus

This report on the Atlanta-Columbus is the fifth of the five regional reports to be completed. The Atlanta region was chosen as an example of an extremely high-growth region. Atlanta was also included because of its size and position as a regional commercial center for a multi-state area. The region's historical development, from a transportation hub to a modern international city, provides valuable insights to our overall analysis and to other regions. A special focus on Columbus allowed us to assess the relationship of nearby metro regions with strengths in some similar clusters.

Organization of the Report

This report is divided into five sections:

- **Section 1** provides an overview of the determinants of regional competitiveness and innovative capacity.
- **Section 2** outlines a methodology for assessing them.
- **Section 3** applies this model of regional economic competitiveness to the Atlanta/Columbus area. It examines the overall performance and composition of the Atlanta regional economy and describes how Atlanta transformed its economy over the course of the 20th century.
- **Section 4** examines the performance of important industry clusters—financial services, transportation and logistics, and information technology—in the region.
- **Section** 5 draws from the regional and cluster-specific analyses to identify lessons that will inform the national Clusters of Innovation Initiative.

The Appendixes include a definition of measurements used and detailed findings of the Clusters of Innovation Initiative Regional Survey™.

The development of specific recommendations and action plans is beyond the scope of this report. Nevertheless, it suggests several new strategic directions to pursue, challenges to overcome, and opportunities to seize in order for the Atlanta and Columbus regions to sustain their competitive position and performance.

The National Clusters of Innovation Conference

The findings of this report and those from the other pilot regions was presented at a National Clusters of Innovation Conference on December 13, 2001, in Washington, D.C. by the Council on Competitiveness. The Atlanta/Columbus findings provided the analytical basis for this conference and other initiatives to sustain our nation's competitiveness and prosperity.

1 REGIONAL COMPETITIVENESS AND INNOVATIVE CAPACITY

DETERMINANTS OF REGIONAL PROSPERITY

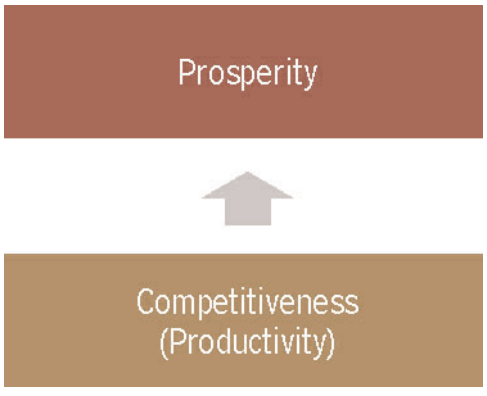
A nation's or region's standard of living is determined by the productivity of its economy (see Exhibit 14). Productivity is measured by the value of goods and services produced per unit of the labor and capital. It sets the wages that can be sustained and the returns earned by investors—the two principal components of a nation's or region's per capita income.

Competitiveness, then, is defined by the level of productivity. Productivity determines prosperity at all geographic levels, whether it is a nation, a region (metropolitan area), or an inner city. In this report, our focus will be on the **regional** level.

Thinking on regional competitiveness is undergoing a significant transition. In many regions, efforts to enhance competitiveness were targeted on lowering the cost of inputs. The focus was on holding down wages, reducing taxes, and recruiting new companies using financial incentives. However, this model has been superseded for advanced economies and is ultimately self-defeating. Inputs such as cheap labor and natural resources are widely available. Prosperity comes from the ability to utilize a region's inputs more productively than other locations in producing goods and services. Low wages do not yield fundamental competitiveness, but they hold down the standard of living. Financial incentives are easily matched by competing regions and erode the tax base needed to invest in education and local infrastructure. In the new model, the only path to sustainable prosperity is to build a regional business environment and corporate capabilities that support high productivity.

Productivity, contrary to popular usage, is more than just efficiency. It also depends on the value of the products or services that a region's firms can produce as measured by the prices they can command. In advanced economies, productivity growth depends heavily on the ability to create higher value products and services, as well on as improving the efficiency of processes. The central challenge in enhancing the prosperity of a region is to create the conditions for sustained productivity growth.

Exhibit 14: Prosperity and Productivity



Productivity does not depend on *what* industries a region competes in, but on *how* it competes. There are no industries that are inherently the most productive and thus more attractive in generating prosperity. In shoes, for example, Northern Italy supports high wages and profits because of the high value that consumers place on its products because of their design, materials, brand recognition, and distribution channels.

Regions should not attempt to pick "winners," or try to create new industries where there are no preexisting advantages to build upon. Instead, the challenge is to upgrade the sophistication and productivity of all the region's industries. Not all companies and industries in a region will be equally successful, but success should be determined by the skills and entrepreneurship of the companies, rather than selective intervention by government.

The most important sources of regional prosperity are created, not inherited. Inherited competitive advantages such as natural resources, geographic location, or a supply of labor are becoming less important in determining prosperity. Globalization has expanded the supply of natural resources, and technology has created new substitutes for them as well as bringing distant locations into the economy. A supply of labor is no longer an advantage in a world where workers are plentiful.

Prosperity depends not on inherited inputs themselves, but on creating the conditions that allow firms operating in the region to be highly productive in the use of inputs. A good example is the oil and gas cluster in Houston. Oil and gas are still produced in Texas, but Texas accounts for only a small and declining fraction of world production. However, Houston has become the world's center of technology and knowledge creation in oil and gas exploration and production, as well as the leading source of most of the sophisticated equipment and services required. This supports high wages and a large base of thriving companies. The most prosperous regions do not export natural resources or even only physical products, but export intellectual capital in various forms.

The prosperity of a region depends on the productivity of *all* its industries. The productivity of a regional economy depends on the average productivity of all its companies and industries, not just those that sell outside the region. Local industries directly affect a region's impact on the standard of living because their productivity has a large influence on the local costs of living. However, local industries also affect the success of a region's industries competing with firms based elsewhere. For example, research on Japan[2] has shown that poor productivity of local industries such as transportation, construction, and wholesaling raised the cost of doing business and thus became a drag on the prosperity of the country despite the existence of some very productive exporting industries. Regional competitiveness, then, depends on ensuring that local companies in fields such as utilities, transportation, health care delivery, and other local services are competitive.

Innovation and Productivity Growth

Productivity today sets current competitiveness, but maintaining, much less increasing, a region's standard of living requires the steady growth of productivity. Especially in advanced, high-wage economies no region can maintain high wages, and hold its own in global markets, by producing standard products using standard methods because they will be imitated by other regions with lower wages.

In advanced regions, prosperity rests heavily on the capacity for continuous innovation. A high level of productivity itself is not enough when developing countries and regions are improving their skills, and can rapidly access modern technology. Advanced regions need to innovate to be able to produce products that

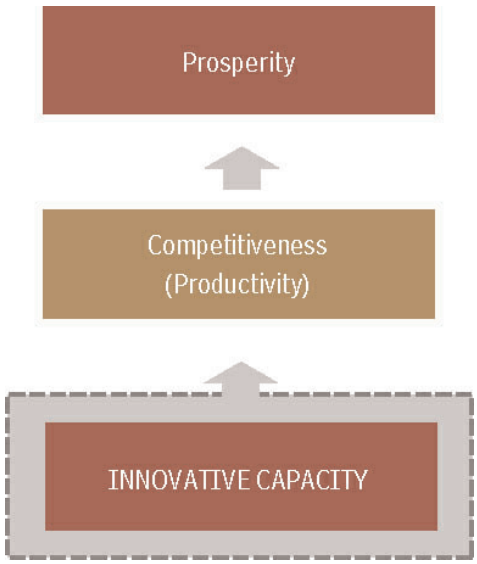
lower wage regions cannot yet make, and to maintain the productivity advantage that supports their higher wages. (See Exhibit 15 below).

Innovation is more than just scientific discovery. Innovation stretches beyond science and technology and includes all the activities involving the discerning of needs and the transformation of knowledge into commercial products, processes, and services. Indeed, some of the most important innovations today occur in marketing, sales, services offered, and distribution; for example, innovation led to the revolution in the small-package delivery that occurred in the last 15 years and resulted in United States global preeminence in this industry.

There are no low-tech industries, only low-tech firms. Today, innovation can drive productivity improvement in virtually every industry. Although industry producing enabling technologies such as biotechnology, computers, software, and communications equipment and services have received much attention, opportunities to apply advanced technology are present in fields as disparate as textiles, machinery, and financial services. For example, the small-package delivery industry was transformed by advanced communication and information processing technologies that led to unheard-of efficiency and the ability to integrate with customers.

In the modern economy, there are no "low-tech" industries, only low-technology companies that fail to incorporate new ideas and methods in their products and services. Innovation can upgrade the sophistication of competition and future productivity throughout a region's economy, not just in a few "high-tech" industries.

Exhibit 15: Innovation and the Standard of Living



THE MICROECONOMIC FOUNDATIONS OF PRODUCTIVITY

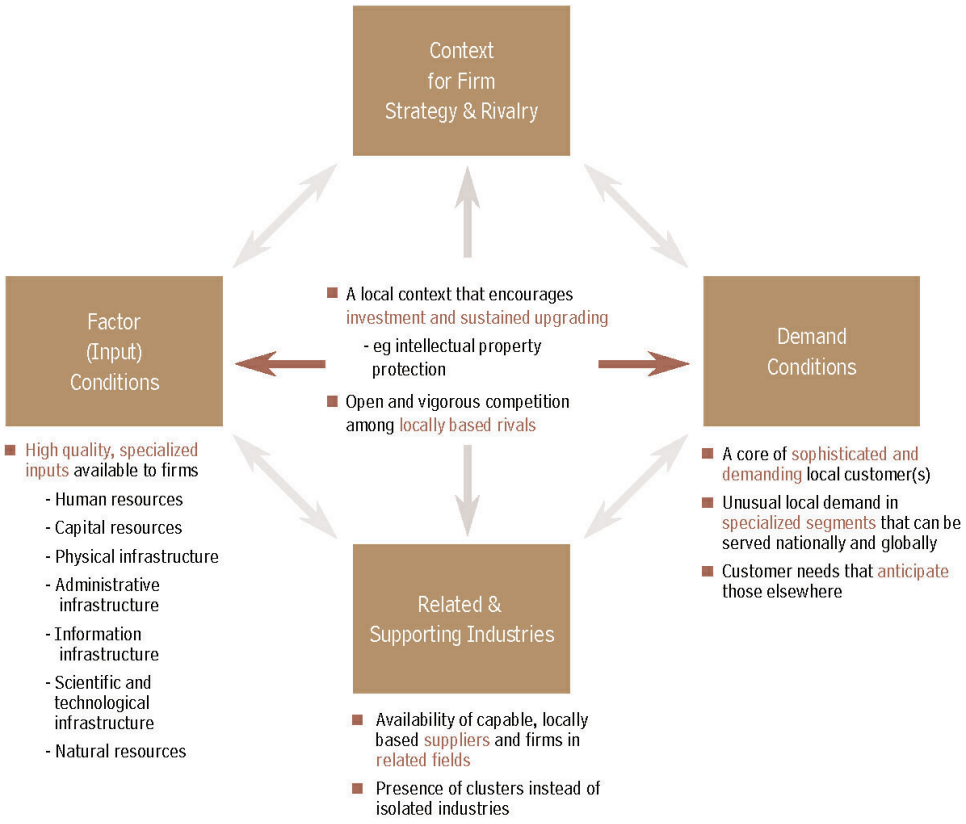
The productivity and innovativeness of a regional economy benefit from overall conditions such as a sound fiscal policy, an effective political decision making process, and sound legal institutions. However, broad regional attributes such as these are increasingly preconditions, not sources of competitive advantage.

Prosperity in a region is actually created by the microeconomic foundations of competitiveness, rooted in the sophistication with which individuals, firms, and industries based there compete. This is what gives rise to productivity. Competitiveness requires ongoing improvement in the quality of corporate management and in the sophistication of company strategies and operating practices. However, the sophistication with which firms compete rests heavily on the quality of the regional business environment in which they operate. For example, the productivity of companies is affected by such things as the specific skills of employees they can attract, the efficiency of the local logistics and transportation system, and the extent to which local regulations impede productivity and innovation or encourage them.

Determinants of Regional Productivity

The quality of a region's business environment is embodied in four broad areas (see Exhibit 16 below). Each of them affects the level of productivity that can be achieved as well as the rate of innovation.[3]

Exhibit 16: Determinants of Regional Productivity



Factor conditions. Achieving high levels of productivity depends on the presence of high quality and specialized pools of human resources, applied technology, infrastructure, and even sources of capital that are tailored to the needs of particular industries. More generic and basic factors such as high school graduates or the local transportation system are foundations that every region must have. Increasingly, competitiveness depends on the presence of advanced and more specialized factors.

Demand conditions. The quality of demand in a region has a strong influence on the process of creating and improving products and services. Sophisticated customers in the region press firms to improve and offer insights into existing and future customer needs.

Traditionally, regions and countries focused on the size of their local market. A large local market, it was believed, would allow local companies to exploit economies of scale and improve competitiveness. However, when firms can easily access national and international markets, the quality, rather than the quantity, of local demand becomes important because it is crucial for innovation.

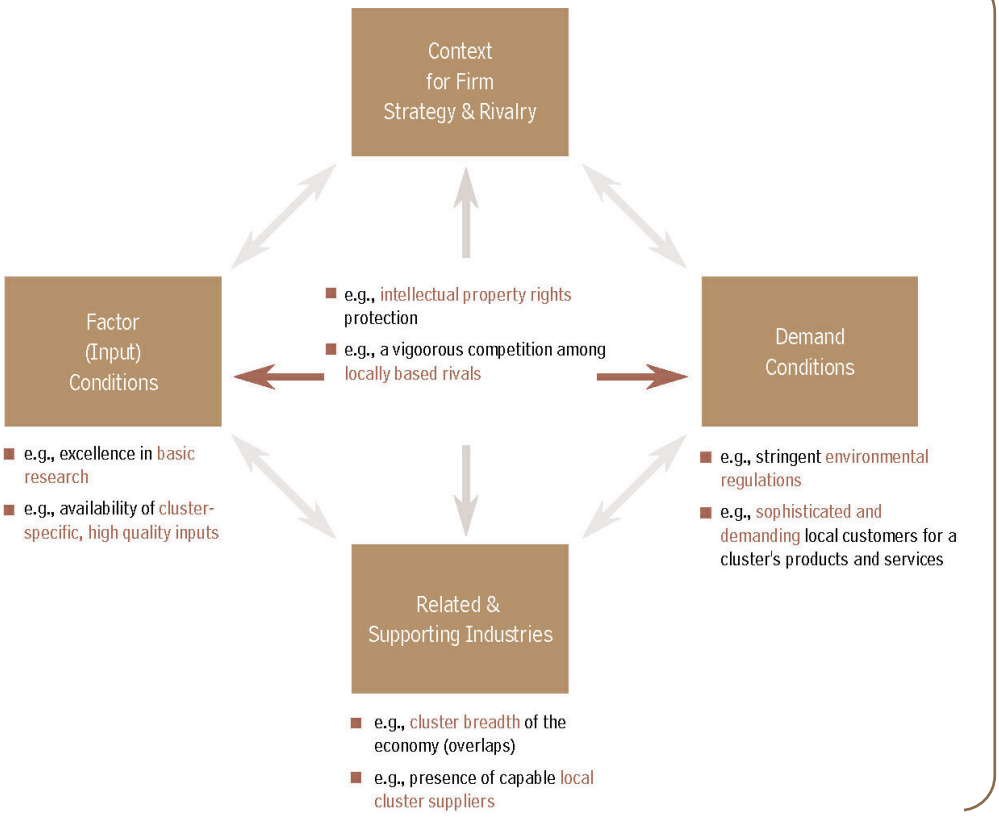
Context for firm strategy and rivalry. The rules, incentives, and pressures governing competition in a region have a fundamental influence on productivity. Policies that encourage investment, protect intellectual property, and open the local market for trade, for example, foster productivity growth and competitiveness. Also exerting a strong influence on productivity are the presence of competing rivals in a region and the intensity of local industry.

Related and supporting industries. Local sourcing from capable suppliers based in the region can enhance productivity and improve the capacity for innovation through allowing quicker and less costly communication, fostering the flow of ideas, and enhancing flexibility through local outsourcing. Traditionally, many regional development programs have focused on attracting individual companies and industries. However, isolated companies cannot be productive without the presence of related and supporting industries.

These four areas of the regional business environment are self-reinforcing and act as a system. Regional rivalry, for example, stimulates the development of unique pools of specialized skills and the formation or attraction of specialized suppliers. Active local rivalry also upgrades regional demand by creating more demanding customers. Weaknesses in any part of the business environment, then, can erode the competitiveness of regions.

All parts of the business environment affect a region's productivity and competitiveness. A subset of the overall environment has particular importance in determining a region's capacity for innovation (see Exhibit 17).

Exhibit 17: Innovation and the Microeconomic Business Environment

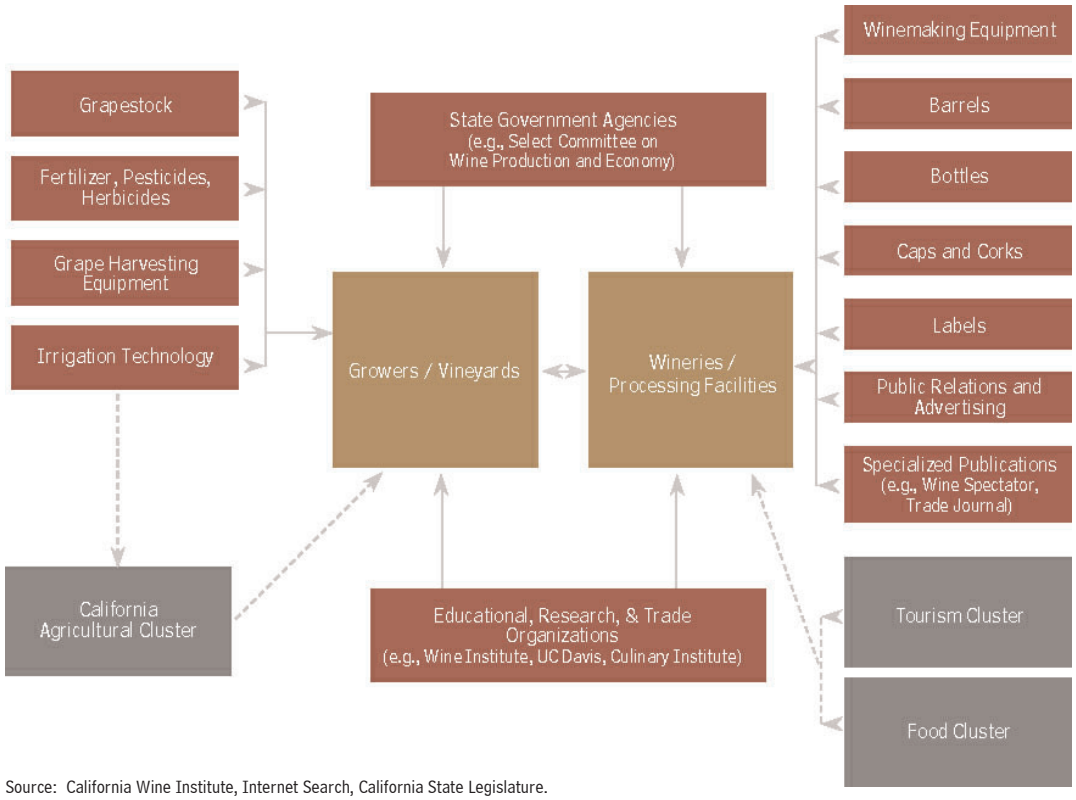


Clusters and Productivity

Clusters are geographically proximate groups of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities. Clusters are normally contained within a geographic area where ease of communication, logistics, and personal interaction are possible. Clusters are normally concentrated in regions and sometimes in a single town.

Clusters cut across traditional industry classifications. Clusters take various forms, depending on their state of development. Well-developed clusters, however, normally include end-product or service companies; suppliers of specialized inputs, components, machinery, and specialized services; financial institutions; and firms in related industries. Clusters also often include firms in downstream or customer industries; producers of complementary products; specialized infrastructure providers; government, universities, and other institutions providing specialized training, education, information, research, and technical support; and standard setting agencies. Finally, many clusters include trade associations and other private sector collective bodies that support cluster members (see Exhibit 18).

Exhibit 18: The California Wine Cluster



Source: California Wine Institute, Internet Search, California State Legislature.
Based on research by MBA 1997 students R. Alexander, R. Arney, N. Black, E. Frost, and A. Shivananda

Clusters enhance competitiveness in three ways.[4] First, they *improve productivity* because firms have ready, efficient access to specialized suppliers, skills, information, training, and technical expertise in a demanding competitive environment. Extensive market, technical, and other specialized information accumulate within a regional cluster. Specialized inputs can be assembled, and relationships are forged among cluster participants. Firms can access trained people and technology at much lower cost than by

developing it internally. The presence of a full range of knowledge, inputs, machinery, and services makes experimentation easier and promotes greater efficiency and flexibility than vertical integration of relationships with distant suppliers.

Second, clusters *foster innovation* by increasing the dynamic effects of the business environment.

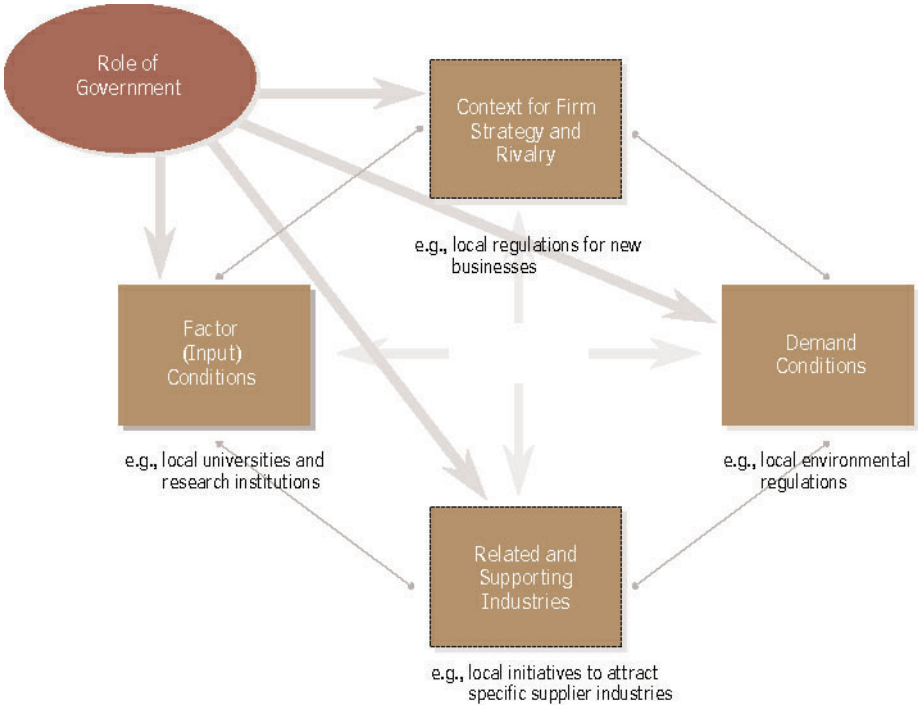
Third, clusters facilitate commercialization of innovation by easing the creation of new firms via start-ups, spin-offs and business lines of established firms. Establishing a new business in a cluster location is easier than elsewhere because all the needed inputs are locally available there, as are cluster awareness and expertise among capital providers such as banks and venture capitalists. The creation of new firms and business units reinforces productivity and encourages innovation.

Clusters draw on both general and cluster-specific aspects of the business environment. Clusters benefit from general national and regional attributes such as intellectual property laws, transportation infrastructure, and the education system. However, the competitiveness of a cluster, and its uniqueness, usually owes much to the specialized circumstances of the location for the particular cluster.

Other Influences on the Business Environment

Government: Government affects competitiveness through its influence on the business environment (see Exhibit 19 below). Government at all levels influences (positively or negatively) the business environment and the productivity of clusters. Government is not monolithic, and its influence occurs through many distinct departments and entities. While the federal government is often seen as having the greatest impact on competitiveness, policies at the regional and even local level are often equally if not more important. Each level of government affects various aspects of the business environment, and the policies of different units of government can frequently be conflicting.

Exhibit 19: Government's Impact on Regional Productivity



Government plays five distinct types of roles in competitiveness, some of which are often overlooked. Government policies can:

- Establish a stable macroeconomic, political, and legal environment
- Improve the availability, quality, and efficiency of generalized inputs, infrastructure, and institutions, such as schools
- Set the overall rules and incentives governing competition such as investment incentives, antitrust laws, and intellectual property protection rules
- Facilitate cluster development and upgrading
- Establish and participate in an ongoing process for defining regional competitive priorities and implementing them across constituencies.

Most governments realize the first three roles. Few governments have effectively addressed the fourth and fifth roles and the second role as far as basic factor conditions are concerned. Advanced factor conditions, incentives, and the institutions and processes of cluster development have become much more important roles of government.

Government's proper role is to improve the business environment rather than to intervene directly in the competitive process. Government should not subsidize individual companies but work to raise the productivity and innovativeness with which companies can operate. Many U.S. regions, for example, have traditionally sought to attract industry through tax incentives and driving down the cost of doing business in terms of payroll taxes, unemployment insurance, utilities, and the like. This approach may be necessary in uncompetitive regions, but it is ultimately self-limiting. Pushing down costs can reduce the revenue necessary to improve education, infrastructure, and services. Improving the productivity of the region, and boosting its innovative capacity, is more effective in increasing the standard of living in the long run.

The traditional separation between the public and private sector no longer applies. In the old model, the public sector was to provide the infrastructure while the private sector focused on competition. In the new model, the level of co-dependence of public and private sector has hugely increased: The public sector needs to set policies in close interaction with the private sector while the private sector derives key sources of its competitive success from outside the firm. The new model also includes a much broader set of institutions such as universities, regulatory bodies, and trade associations.

Institutions for Collaboration

Institutions for collaboration are formal and informal organizations and networks that (1) facilitate the exchange of information and technology; and (2) foster various kinds of local coordination and collaboration that can improve the regional business environment. Institutions for collaboration, then, create and amplify the arrows and feedback loops in the regional innovation platform.

Institutions for collaboration take various forms (see Exhibit 20). Some are economy-wide or address broad sectors, while others are cluster-specific. Institutions for collaboration affect productivity and innovation in a number of ways. First, they create relationships and enhance the level of trust in these relationships. Second, they facilitate the organization of collective activity. Third, they encourage the definition of common standards, rules, and norms that stimulate competition or boost productivity. Finally, they can be mechanisms to develop a common economic or cluster agenda.

Exhibit 20: Examples of Institutions for Collaboration

General	Cluster-specific
■ Private sector - Chambers of Commerce - Professional associations ■ Public sector - Economic development agencies ■ Jointly private / public - Advisory councils - Competitiveness councils ■ Informal networks - School networks - Religious networks	■ Industry associations ■ Specialized professional associations and societies ■ Alumni groups of core cluster companies ■ Incubators

Economic Attitudes, Values, and Beliefs

A final influence on regional competitiveness and innovative capacity is more intangible. Attitudes, values, and beliefs about the economy—which are often termed "culture"—bear on the behavior and aspirations of individuals, firms, and other institutions in a region. Of particular importance in an advanced economy like the United States are beliefs about the importance of entrepreneurship, attitudes toward collaboration, and civic mindedness.

REGIONAL INNOVATIVE CAPACITY

While all parts of the diamond affect a region's competitiveness, a subset of the business environment has particular importance in determining a region's innovative capacity (see the Council report *The New Challenge to America's Prosperity: Findings from the Innovation Index*[5]).

Some aspects of the business environment contribute to innovation across all or many fields. We refer to these as **common innovation infrastructure.** They include the university system, intellectual property laws, the pool of scientists and engineers, and the region's venture capital firms. While some common innovation infrastructure is determined nationally, most is regional in scope.

Other parts of the diamond that contribute to innovation are specific to particular regional clusters. They include the presence of specialized research institutions, individuals with particular technical skills, or venture capitalists who specialize in a particular cluster.

Institutions for collaboration have an important role in innovative capacity, just as they do in competitiveness overall. Especially important are the organizations and networks that facilitate technology transfer and link universities to firms.

Traditionally, firms and universities could operate separately. Firms had their own R&D departments, including basic research. Universities concentrated on academic research largely independently of the private sector. Today, however, innovation depends on much greater company-university interchange. Companies depend not only on internal R&D but also on technology from suppliers, specialized research institutions, and applied university research programs. In this new context, the need for institutions of collaboration has increased substantially.

THE COMPOSITION OF REGIONAL ECONOMIES

Regional economies are composed of three broad types of firms and industries. Each is important to a region's prosperity, but in different ways.

The first type is industries that compete across locations. In the United States, this competition often occurs between domestic regions but may also include foreign locations. Grouped into clusters, this type of industries is called "traded."

The second type is industries that are resource-driven. These industries tend to develop in locations to extract a localized natural resource.

The third type is industries that compete only within their region. This type of industries is called "local." Local industries are intrinsically tied to the traded industries located in their region: they directly serve the needs of the traded industries as suppliers and service providers, and they indirectly depend on the success of the traded industries through their influence on final consumer demand.

Types of Clusters

Traded clusters have a disproportionate influence on regional prosperity and economic growth. Traded industries can, in principle, be located anywhere. But similar traded industries tend to concentrate in specific locations. Because they grow beyond the size and the needs of the local market, they can become much more sophisticated and productive. Their high productivity can support high wages that support the prosperity of their employees but also support the prosperity of others through the consumer demand they create.

Resource clusters can support high wages but have limited scope in advanced economies. Resource-driven industries also compete across regions, but their location is tied to local resources. Their performance is much more dependent on the way the industries use technology and innovative processes than on the direct value of the natural resources they process. For example, despite virtually identical natural conditions, the pulp and paper industries in Finland with their sophisticated use of technology achieve much higher productivity than their less advanced competitors in Canada.

Local clusters account for the majority of employment in regional economies. Because local industries serve only the local market and most are services, they have more limited opportunities for productivity growth. This means that local industries tend to account for an increasing share of regional employment.

Traded industries seem to be more dispersed than they really are because most firms establish distribution centers, sales offices, service facilities, and other supporting functions in almost every region. The locations where truly competitive firms are based are usually limited in number.

The traded economy is specialized by cluster. Cluster are geographically proximate groups of interconnected companies and associated institutions in a particular field, linked by commonalities and complementaries. Regional economies can be profiled on the mix of clusters present. It is on the level of individual clusters that regional economies specialize.

Specialization in a series of strong clusters with a significant national position enhances a region's performance. Clusters that can attain the critical mass gain productivity and innovative benefits. A region that depends heavily on just one or very few clusters for much of employment, however, can be exposed to shocks and instability both in those clusters and in the local industries that depend on them.

For example, the recent downturn in the information technology cluster has been especially detrimental to Singapore, a city-state with an economy heavily dominated by this cluster.

Traded clusters drive regional prosperity. While local clusters account for roughly two-thirds of employment in an average region, traded clusters heavily influence the prosperity and growth of a region. This is because traded clusters can achieve higher productivity, their growth is unconstrained by the size of the local markets, and their success creates much of the demand for local clusters.

Exhibit 21 shows the average composition of regional economies in the United States. Traded clusters accounted for 32.1% of total employment in 1999, with an average wage in 1999 of $41,678. Local clusters account for 67.1% of employment in 1999 with an average wage of $26,049. The average wages of traded clusters have grown at a compound annual growth rate of 5.0% between 1993 and 1999, compared to 3.8% for local clusters.

The higher wages of traded clusters reflect their much higher productivity, shown in Exhibit 16. This, in turn, is due in part to the far higher rate of innovation in traded clusters as measured by patents per 10,000 employees.

Exhibit 21: Composition of Regional Economies, United States

	Traded Clusters	Local Clusters	Natural Resource-Driven Industries
Share of Employment	32.1%	67.1%	0.8%
Employment Growth 1993 to 1998	2.5%	2.8%	– 0.1%
Average Wage	$41,678	$26,049	$31,264
Relative Wage	134.0	83.8	100.5
Wage Growth	5.0%	3.8%	2.5%
Relative Productivity	144.1	79.3	139.5
Patents per 10,000 Employees	20.5	1.4	6.4
Number of SIC Industries	592	241	46

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

2 REGIONAL STUDY METHODOLOGY

The Clusters of Innovation Project examined five regions: Atlanta/Columbus, Pittsburgh, the Research Triangle, San Diego,and Wichita. For the purposes of this study, a region is defined as a metropolitan statistical area (MSA) using United States Department of Commerce boundaries, and, in some cases, the economic area (EA).[6] The five regions were selected to provide a diversity of size, geography, economic maturity, and perceived economic success. The regions are similar enough to allow interesting comparisons, yet diverse enough to encompass a wide variety of challenges and opportunities in regional economic development.

The focus of the regional analysis is on both overall competitiveness and capacity for innovation, a key enabler of future competitiveness. In each region, we examine five areas:

- Regional economic performance
- The evolution and composition of the regional economy
- Assessment of the region's business and innovation environment
- The competitiveness of selected regional clusters
- Findings and implications for the regional agenda

Data for the study were drawn from a number of sources. Performance indicators were assembled from a variety of sources such as: the U.S. Census data, County Business Patterns, Department of Commerce Trade Statistics, PriceWaterhouseCoopers Money Tree database, and the *Inc. 500* List.

The principal source of quantitative data on the composition and performance of the overall economic and specific clusters was the Cluster Mapping Project of the Institute for Strategy and Competitiveness at Harvard Business School. The Cluster Mapping Project (CMP) has compiled in-depth data on employment, wages, establishments, and patenting activity by cluster at the county level. It provides an objective basis to compare the composition of regional economies and assess the relative position of a region's clusters (see the description below).

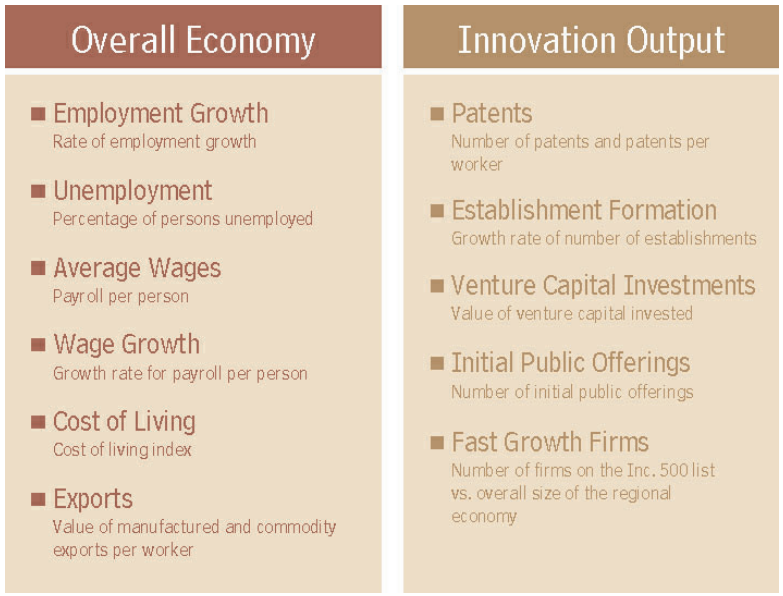
To analyze the business and innovation environment, we reviewed previous studies and conducted primary research. To generate new quantitative data, an extensive survey was conducted of business, government, and non-profit leaders in the region. (The full survey is included as Appendix 2). Surveys were completed by 202 executives at companies and institutions throughout the region.

We also conducted 43 in-depth interviews with a selection of Atlanta leaders. Of these, 25 were with business executives, and 18 were executives in other clusters, academia, government, or institutions for collaboration.

REGIONAL ECONOMIC PERFORMANCE

The study examined regional economic performance on two levels. At the broadest level, we compared the region to other regions on various indicators of economic prosperity such as employment, wages, cost of living, and exports. To assess potential future competitiveness, we examined measures of innovative output and entrepreneurship including patents, establishment formation, venture capital investments, the prevalence of fast growing companies, and initial public offerings. Wherever possible, we tracked both the level and the growth rate of each performance indicator. We compared the performance of the Atlanta economy to the national economy as a whole, as well as to other technology-intensive regions. (see Exhibit 22).

Exhibit 22: Economic Performance Indicators, Atlanta



THE COMPOSITION AND EVOLUTION OF THE REGIONAL ECONOMY

Especially in advanced nations such as the United States, regional economies are specialized, with each region strong in a different mix of industry clusters. Comparing regional economies has been difficult because clusters have not been systematically identified or mapped across all U.S. regions. To address this challenge, Professor Porter and his team at Harvard Business School have defined clusters statistically and assembled detailed data by industry and cluster on employment, wages, establishments, and patenting over time for every region in the United States. (See page 17-18 for a summary of the Cluster Mapping Project.)

The Cluster Mapping Project provides an objective, quantitative way to profile regional economies, compare them over time, and measure the strength, evolution, and performance of the region's clusters. The cluster mapping data is used to identify the most important clusters in the region's economy, understand the drivers of the region's relative wages, employment growth, and formation of new establishments, assess the region's patenting performance, and examine the region's relative position versus other regions overall as well as in its leading clusters.

CLUSTER MAPPING PROJECT METHODOLOGY

- The purpose of the Cluster Mapping Project is to assemble a detailed picture of the location and performance of industries in the United States, with a special focus on the linkages or externalities across industries that give rise to clusters.
- The raw data for the project are County Business Patterns data (excluding agriculture and government) on employment, establishments, and wages by four-digit Standard Industrial Classification (SIC) Code by U.S. county. In addition, U.S. patent data by location of inventor are allocated to industries and clusters using a concordance of technology classifications with SIC Codes.
  - Confidentiality limitations mean that actual data are not disclosed for every county and economic area in every industry. Various techniques are used to compensate for missing data.
- Economies are analyzed at various geographic levels, including states, Economic Areas, Metropolitan Statistical Areas (MSAs), and counties.
- All the industries in the economy are separated into "traded" and "local" based on the degree of industry locational dispersion across geographic areas. Local industries are those present in most if not all geographic areas, are evenly distributed, and hence primarily sell locally. Traded industries are those that are concentrated in a subset of geographic areas and sell to other regions and nations.
- Among traded industries, clusters are identified using the correlation of industry employment across geographic areas. The principle is that industries normally located together are those that are linked by some external economies. These industries, then, constitute a cluster.
- Clusters are defined initially using state-level data (n=50). The robustness of cluster composition is verified using Economic Areas as the geographical unit.
- Clusters are constructed using two approaches, which are then reconciled:
  - Select a prominent "core" industry in a field or part of the economy. Calculate the locational correlations of all other industries with the core. Those industries with statistically significant correlations with the core define the extent of the cluster.
  - Calculate locational correlations between all pairs of industries in a general field and potentially related fields. Those sets of industries with statistically significant and substantial intercorrelations among each other define the cluster.
- In both cases some industries may have spurious correlations to a cluster because of the co-location of several strong clusters in the same geographical area. Spurious correlation is eliminated using Input-Output tables, industry definitions, and industry knowledge.[A2]
- Note that a given industry can be *part of more than one cluster.* This sometimes reflects overly broad industry definitions. However, it is also the case that there are multiple forms of externalities, and some industries are suppliers or customers of many other industries. Thus, overlapping clusters are expected and their overlaps are important economically (see Exhibit 41, Cluster Overlap in the U.S. Economy; Number of Clusters with Common Industries, Section 6, page 56).
- The process of statistically defining cluster boundaries resulted in 41 traded clusters in the U.S. economy. These are shown in the figure below, grouped into broad categories.

- Clusters can be defined using "narrow" or "broad" definitions. We use *narrow cluster definition* to refer to the subset of the industries that are *most correlated* with a given cluster. Analysis using narrow cluster definitions eliminates cluster overlaps. An industry is a narrow industry for only *one* cluster.
- *Broad cluster definition* includes *all* industries with statistically significant locational correlations. This includes industries with stronger locational correlations with another cluster. Analysis using broad cluster definition includes the overlap among clusters. This overlap is important to understanding cluster competitiveness, but leads to double counting of employment, which leads to difficulties of interpretation for some analyses.
- Subclusters are subsets of cluster industries that are the most strongly correlated with each other relative to the rest of the cluster. There are subsets of industries where linkages are particularly strong. We define the subcluster statistically for each cluster. Separate subclusters are defined for narrow and broad cluster definitions. There are 244 subclusters in the 41 traded clusters defined using narrow cluster definition. An additional 245 subclusters arise among industries outside the narrow cluster that fall into the broad cluster definition.
- We also grouped the 241 local industries into clusters primarily using industry knowledge. There are 16 local clusters ranging from local health services and local utilities to local retail clothing and accessories. We did not analyze local clusters extensively in this project, but focused on cross-regional competition. Local clusters are crucial for examining the patterns of location with metropolitan areas.

Upstream

Materials and Metals
- Construction Materials
- Metal Manufacturing

Forest Products
- Forest Products

Petroleum/Chemicals
- Oil and Gas
- Chemical Products
- Plastics

Semiconductors/Computer
- Information Technology

Industrial and Supporting Functions

Multiple Business
- Education and Knowledge Creation
- Heavy Machinery
- Financial Services
- Motor Driven Products
- Prefabricated Enclosures
- Production Technology
- Analytical Instruments
- Heavy Construction Services

Transportation and Logistics
- Automotive
- Motor Driven Products
- Transportation and Logistical Services

Power
- Power Generation
- Power Transmission and Distribution

Office
- Publishing and Printing

Telecommunications
- Communications Equipment

Defense
- Aerospace Engines
- Aerospace Vehicles and Defense

Final Consumption Goods and Services

Food/Beverages
- Agricultural Products
- Processed Foods
- Fishing and Fish Products

Housing/Household
- Building Fixtures, Equipment and Services
- Lighting and Electrical Equipment
- Furniture

Textiles/Apparel
- Textiles
- Apparel
- Footwear

Health Care
- Medical Devices
- Pharmaceuticals

Personal
- Sporting and Leather Goods
- Jewelry and Precious Metals
- Tobacco

Entertainment/Leisure
- Entertainment
- Hospitality and Tourism

ASSESSMENT OF THE BUSINESS AND INNOVATION ENVIRONMENT

The quality of the overall business and innovation environment includes both common characteristics that affect the entire economy and the particular circumstances in important regional clusters. We first examine overall competitiveness with special emphasis on the environment for innovation. The exhibit below illustrates some of the dimensions of the overall business environment analyzed in each region.

Exhibit 23: Business Environment and Cluster Indicators

	Common	Cluster-Specific
Basic and Specialized Factor Inputs	■ Information and communication infrastructure ■ Skilled workforce ■ Investment in educational capacity ■ Availability of risk capital ■ Quality of life	■ Presence of specialized research centers ■ Presence of specialized talent base ■ Presence of specialized training and education institutions
Context for Firm Strategy and Rivalry	■ Tax policy (e.g., investment incentives)	■ Intensity of rivalry among firms in the cluster ■ Degree of cooperation between firms in the cluster
Related and Supporting Industries	■ Regional position in broad based industries such as business services and energy	■ Extent of related industries inside and outside of the cluster
Sophistication of Demand	■ Overall regional education and per capita income levels	■ Sophistication of the demand in the region for the clusters' products and services
Government	■ Zoning regulations ■ Coordination between government agencies	■ Cluster-specific regional policies
Institutions of Collaboration	■ Existence of regional institutions of collaboration	■ Existence of cluster-specific institutions for collaboration
Attitudes toward Value Creatiion	■ Regional attitudes toward the sources of economic prosperity	■ Cluster-specific attitudes toward the sources of economic prosperity

THE COMPETITIVENESS OF SELECTED REGIONAL CLUSTERS

In each region, two or more clusters were selected for in-depth analysis. All clusters are important to the regional economy and are worth of study. However, the limitations of time and resources meant that we utilized studies of a few clusters to gain insight into the region's challenges and opportunities at the cluster level. Exhibit 24 lists the clusters analyzed in each region.

Clusters were chosen for analysis based on size, importance to the region, stage of development, and perceived success. We also coordinated the choice of clusters across regions to permit cross-regional comparisons. Overall, eight of the 41 traded clusters in the United States economy were analyzed in at least

one region. We also examined the same cluster (e.g., information technology in Pittsburgh and Atlanta) in more than one region to investigate differences across regions in the economic and innovation performance of the cluster.

To assess the performance of a cluster, we compared a particular regional cluster (e.g., information technology in Atlanta) to the national cluster and to other benchmark regions (e.g., the information technology cluster in Boston).

In analyzing each cluster, we paid particular attention to its historical evolution, not just its current circumstances and future challenges. The process by which clusters developed was both revealing about the region's competitive circumstances and important to understanding how the region might expand its economic base into new fields.

Exhibit 24: Regions, Clusters, and Unique Data

IMPLICATIONS FOR THE REGIONAL AGENDA

The study revealed many implications for local leaders at both the regional and cluster level. Implications cut across government and the private sector, and other institutions such as universities and trade groups. Some of the most important implications arose in the following areas:

- Reasons for the region's past successes
- Areas of the business environment that need improvement
- Issues and opportunities facing particular clusters
- Opportunities for regional growth that are not being pursued

3 ASSESSMENT OF THE ATLANTA REGIONAL ECONOMY

Over the past 40 years, Atlanta has successfully transformed itself from being the home of Coca-Cola and a regional distribution center into a truly global business center. Today the region is home to 11 Fortune 500 headquarters, the busiest passenger airport in the United States, and more than 4 million people. The economy has diversified into a variety of industries, including mass media and information technology, and strengthened traditional clusters like transportation and logistics and communications. Thanks to the Olympics and CNN, citizens of the world recognize Atlanta and its importance. No one could see Atlanta as anything but a success in terms of its growth.

But this success has brought significant new challenges to the region. Rapid development of the region has given rise to a number of negative trends—such as dangerously poor air quality and massive traffic delays —that are undermining the Atlanta quality of life, a traditional regional advantage. The cost of living in the region, once a major draw to relocating companies, is now higher than the U.S. average. As in many U.S. cities, the middle class is struggling to find affordable housing. The increasing number of residents has also put a strain on the primary and secondary school system, a system that was already stretched to provide a good education to all of Atlanta's youth. The wealth generated by the region's spectacular growth has not translated into prosperity for all groups in the community. Despite advances, Atlanta still has significant pockets of poverty, particularly among its minority communities. Together, these trends pose a threat to the region's future progress.

Our main analysis focuses on the economy of the metro Atlanta region, which corresponds with the 20-county Atlanta metropolitan statistical area (MSA), as defined by the U.S. Department of Commerce. In addition, the study contains a special focus on the Columbus, Georgia area, with an eye toward assessing how smaller regions can develop their own identity while taking advantage of their proximity to major metro areas.

We begin with a brief historical perspective, which is essential to understanding Atlanta's past successes and current challenges. We then evaluate the economic and innovation performance of the region using a variety of metrics. To understand this performance, we describe the composition of the economy and its position relative to other regions. We then assess the strengths and weaknesses of the region's competitiveness and innovative capacity. The numerous issues and challenges uncovered in the analysis along with an assessment of future opportunities are included in the final chapter.

HISTORICAL DEVELOPMENT OF THE ATLANTA REGIONAL ECONOMY

Over the past 160 years Atlanta has grown from a secondary railroad transit point into a thriving metropolis of four million people with a diverse and successful industrial base. Despite its good location and significant natural resources, the Atlanta region was by no means predestined to become an international commercial center. Rather, the current success of the Atlanta region is built squarely upon a history of conscious efforts to spur business and economic growth.

Atlanta's economic history can be roughly divided into six periods that trace its rise from a local transport hub into a global industrial center.

The Beginning: Rail Transportation Hub: 1830s-1860s. Atlanta was established as a railroad hub in the late 1830s. For the first few years, the town served as a stopping point along the way from other, more established cities like Macon, Chattanooga, and Augusta. By the beginning of the Civil War, however, Atlanta had already begun to establish itself as a business center. In 1861, the town had a population of close to 10,000 and had a number of foundries, fine tourist hotels, and commercial buildings. As Atlanta historian Gary M. Pomerantz chronicled, "It was an upcountry town. Everything about it seemed fresh and new, if dusty. It was becoming a commercial center, a window to the region's industrial history."[9]

Center of Industry in "The New South": 1870s–1920s. The burning of Atlanta on November 14, 1864 set back Atlanta's industrial development—but not for long. Atlanta leaders wasted no time in beginning the rebuilding process. By the end of 1865, 150 stores were back in operation, and land values in 1870 were triple those of 1860.[10]

In the wake of the Civil War, Atlanta leaders were determined to construct a new political and commercial capital in Georgia. The emancipation of slaves meant that the plantation-based agricultural system that had led to rural power in Georgia was no longer viable. As a result, economic power in the state shifted toward manufacturers and merchants. Atlanta business leaders took advantage of this shift to also capture the political power. In 1868, city leaders convinced the State Assembly to move the state capital from Milledgeville to Atlanta by promising to build for free any state building required for the next ten years. This sort of economic incentive and bold political move is indicative of the growth-focused culture that has developed in modern Atlanta.

In 1871, U.S. Senator Benjamin Hill suggested a vision for a "New South" that would develop Southern industry based on the exploitation of ample natural resources and cheap labor that could be used in factories.[11] Henry Grady, the influential editor of the Atlanta Constitution newspaper, became the most outspoken proponent of this idea. In a famous 1886 speech to the New England Society in New York, he introduced the concept as an opportunity for Northern capitalists and Southern businessmen to use commercial ties to repair the rift of the Civil War.

When Grady made the speech, Atlanta had not yet developed into the vibrant commercial hub he described, nor had Atlanta "built a brave and beautiful city…(without) one ignoble prejudice or memory."[12] Hatred of the North and of blacks was still very much part of the fabric of life in Atlanta and Georgia. However, on the commercial side at least, the vision crafted by Grady and other Atlanta boosters would be borne out.

Between 1880 and 1910, Atlanta became a magnet for former farmers, both master and slave, who came in search of jobs in the city. The population of Atlanta quadrupled over the 30 years to 150,000, as the city established itself as the capital of the "New South." Throughout Georgia, textile mills were being constructed to process cotton into clothes and linens. Atlanta took its place as the education, transportation, and commercial center for the textile industry. In 1885, the City of Atlanta and the State of Georgia established the Georgia Institute of Technology (Georgia Tech) to train the new generation of industrial engineers and business leaders. Ten years later, Atlanta was host to the Cotton States and International Exposition, a massive civic undertaking that lasted a hundred days and drew more than 800,000 visitors to Piedmont Park.[13]

Through the beginning of the 20th century, Atlanta continued to slowly widen its industrial base and strengthen its position as the regional trading and transportation hub for agricultural and textile products. Blacks in Atlanta had greater opportunities and experienced less violence than in other parts of the state but were still officially second-class residents who were not allowed to interact with whites. Segregation was the law of the land.

Industry Attraction to "Forward Atlanta": 1920s–1950s. At the end of 1910, international cotton prices began to fall and Atlanta leaders started to focus on attracting new industries from outside of the region. In 1917, Ivan Allen Sr. assumed the mantle of president of the Atlanta Chamber of Commerce with the pledge of "more smokestacks for Atlanta." The onset of World War I slowed his plans but was still somewhat of a boon for Atlanta as the ranks of its two Army camps increased to 43,000.[14]

By the mid twenties, the war was over and Atlanta leaders felt that the city was not growing as fast at it should. Cities like Miami and Birmingham were thriving, which many Atlantans viewed as a direct challenge to their regional leadership. In order to improve Atlanta's image and attract capital, the Atlanta Chamber began a massive campaign to market the city. Following Allen's leadership and well-honed salesmanship (he had begun his career by selling typewriters), city business leaders funded a program to position Atlanta as the logical place to establish Southern branch plants and other operations of Northern-based companies. In advertisements and interviews placed in leading national magazines, the Chamber described the virtues of Atlanta's location, transportation facilities, low cost of living, and favorable climate. The four-year-long "Forward Atlanta" effort was extraordinarily successful, attracting 679 new factories, warehouses, and sales offices, creating 17,000 new jobs, and significantly diversifying the city's economy.[15]

Through the 1930s and 40s, Atlanta continued to grow and consolidate its position as the regional center for business in the Southeast. During World War II, Atlanta and the entire state benefited from massive federal government defense investments that established 20 military installations in the state and expanded regional textile and munitions factories to support the war effort. In 1948, for the first time, manufacturing employment surpassed agricultural employment in the state, and Georgia's per capita income had grown to 66% of the national average.[16] In Atlanta, the per capita income was significantly higher.

During the 1950s, Atlanta continued to grow— reaching one million in population. Characteristically, city leaders, led by Mayor William Hartsfield, held a celebration to mark the occasion. To celebrate "M-Day," $500 billion in fake Confederate money was printed in one million dollar bill denominations and

distributed to local, state, national, and world leaders. In 1958, Newsweek crowned Atlanta as the "nerve center of the New South." Despite the fact that Mayor Hartsfield had started calling Atlanta " the city too busy to hate," racial divisions were beginning to undercut the Atlanta image.

"The City Too Busy to Hate:" 1960s. In the early 1960s, Atlanta businesses continued grow with the community. In 1963, the city had only 2% unemployment, and housing and new business starts continued to lead all Southern cities.[17] New Mayor Ivan Allen Jr. presided over large public works projects like the construction of the Fulton County (baseball) Stadium, a new convention center, and the expansion of a runway at Hartsfield Airport, which had opened only four years earlier. Local banks, now the largest in the South, thrived. Retail stores increased sales, as did leading local firms like CocaCola and AT&T.

However, the economic growth was not evenly spread. Significant slums existed in Atlanta that were almost entirely inhabited by black residents. The Civil Rights movement, led by Atlantan Martin Luther King Jr. and institutionalized by the Civil Rights Acts, emboldened blacks to express their frustration. In 1966, despite efforts by the Allen administration and other white community leaders to address economic inequality, Atlanta joined other major U.S. cities in facing violent racial unrest. In early September of that year, a brick-throwing riot sparked by Stokeley Carmichael, the leader of the Student Non-Violent Coordinating Committee, rocked Atlanta. Thanks to the efforts of 25 black ministers, 700 policemen and 300 state troopers, and the white mayor, who rushed to the riot site, the angry uprising was contained.

After the riot, Mayor Allen stepped up his efforts to engage black and white community leaders, including King, in efforts to improve the conditions of blacks in Atlanta. In the summer of 1967, when race riots broke out in more than half a dozen major U.S. cities, including nearby Birmingham, Atlanta remained relatively calm.

In 1968, Martin Luther King was assassinated in Memphis. Five days later, his funeral, with 150,000 mourners and a worldwide audience, took place in Atlanta. Despite the expected outbreak, the day turned out to be a peaceful memorial to King. Allen, who had been alongside Coretta Scott King when word of Dr. King's death arrived, worked with city leaders and Atlanta University Center presidents to make sure that the ceremony was appropriate and peaceful. Unknown to the public, the mayor had received a limitless financial guarantee from the "Boss," Bob Woodruff, the CEO of CocaCola, to make sure the funeral was done right.[18]

In the eyes of the nation and national business leaders, Atlanta had proven it could overcome racial segregation. The way the city handled the King assassination and the election of Maynard Jackson in 1973 as the first black mayor of a major Southern city gave the city credibility that other Southern cities lacked. Compared to Southern competitors, the Atlanta region became a much more attractive location for branch plants as well as Southern regional headquarters.

National Recession and Atlanta Recovery: 1970s and 80s. During the 1970s, Atlanta was struck with the same recession that hit the United States as a whole. Unemployment rose to 7.5% and some downtown retailers had to shut their doors. Mayor Jackson instituted an affirmative action program for government contracts that required minority participation in major projects. While some white businesses complained and a few left the community, more black businesses thrived. The region continued to expand its air transportation infrastructure to promote commercial development.

The 1980 completion of the midfield terminal at Hartsfield made the airport the largest in the world in terms of land area and was important in luring Eastern Airlines to expand its regional hub. Still, at the end of the decade Atlanta was slumping.

To address the economic challenge, a group of influential Georgia Tech alumni known as the Committee of Twenty initiated the Technology Business Project in 1978. These private sector leaders thought that Georgia Tech could become a more significant economic force by fostering high-technology businesses in the area. These leaders convinced Tech President Joseph Petit and Governor George Busbee that a public-private sponsored incubator at Georgia Tech would spur technology firm development. The Atlanta Technology Development Center (ATDC) was opened on the Georgia Tech campus. When anticipated federal government funds did not materialize for the expansion of the center into a new building, the state made up the difference. Since 1980, state funding has annually supported the ATDC. Many present Atlanta business leaders view the opening and operations of the ATDC as a critical ignition point for the modern day information technology cluster in the region.

Another important event that both ensured ATDC funding and spurred additional state science-based economic development support was Atlanta's unsuccessful 1984 bid to attract the Microelectronics and Computer Consortium (MCC). In the wake of Atlanta's loss to Austin, regional business leaders worked with Georgia Governor Joe Frank Harris to create state-funded research centers at Georgia universities. From 1986 to 1990, at least six research centers were established at the University of Georgia, Georgia Tech, and Emory, including a competing Microelectronics Research Center at Georgia Tech..

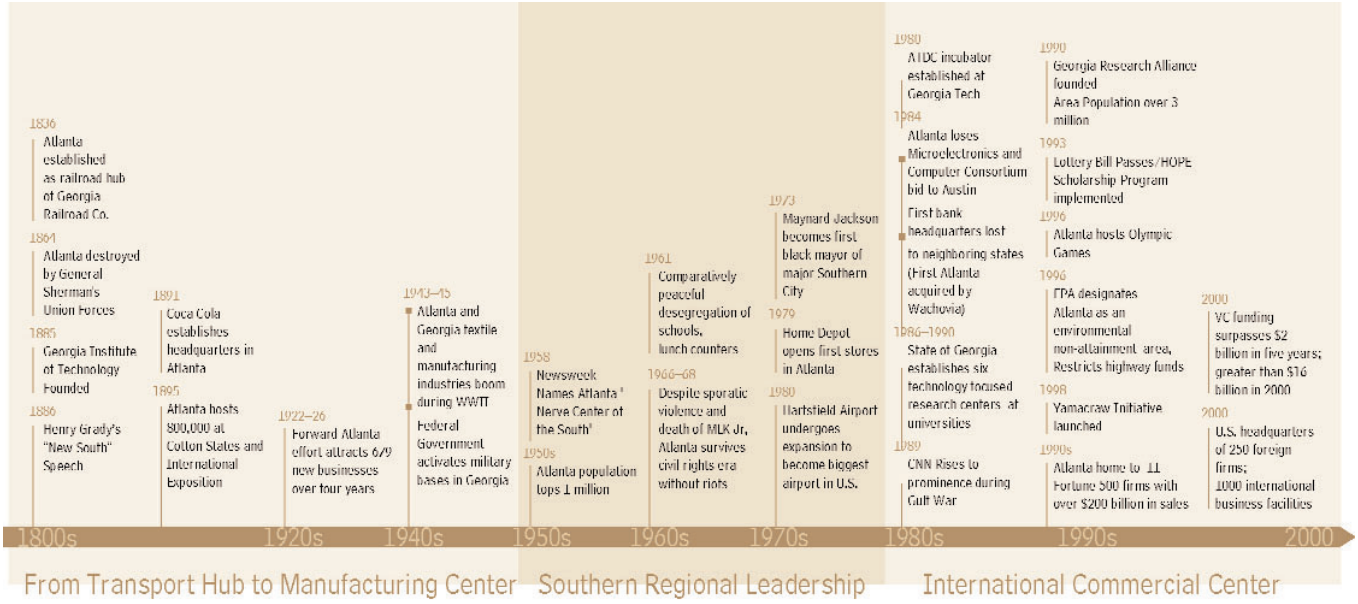
International Commercial Center: 1990s. The 1990s can be characterized as nothing less than a boom in Atlanta. Population grew from 2.8 million to 4.1 million. More than 600,000 new net jobs were created; more than 25,000 new business establishments opened; average wages increased; and established companies like Coke, Georgia Pacific, and UPS prospered. With the Olympics, Atlanta earned an undisputed place on the world stage.

Atlanta's international decade actually began a year early. The Gulf War in 1989 thrust the Cable News Network (CNN) and its Atlanta World Headquarters into the minds of the world's citizens. An even more important economic and public relations impact resulted from an announcement made in 1990 that Atlanta had been selected to host the 1996 Olympics. Years of fund-raising and intense marketing led by lawyer Billy Payne culminated when the International Olympic Committee selected Atlanta over Athens to host the games.

The community focus on the Olympics may have overshadowed some of the business successes that were taking place in Atlanta. While new stadiums, dorm complexes, and technology infrastructure were being constructed, so too were new office buildings in the sprawling suburbs north and east of the city. Technology start-ups like Mindspring and iXL were also beginning to emerge. Many, like Mindspring and Echostar, were incubated at the ATDC.

Governor Zell Miller and the State General Assembly, encouraged by some influential Atlanta business people, continued to expand upon state-sponsored economic development plans. The Georgia Research Alliance (GRA), an innovative collaboration between six Georgia universities (four in the Atlanta MSA), state government, and private sector leaders, was first funded in 1991. The Hope Scholarships, a program aimed at assisting bright Georgia students to attend Georgia colleges was established in 1993. Another

Exhibit 25: Historical Development Timeline for Atlanta



Source: Regional Interviews, secondary sources

state-sponsored, university-based economic development program, the Yamacraw Project, was initiated in 1998. Like the GRA, this effort seeks to attract, equip, and retain top university researchers in leading technology fields.[19]

By the end of the decade, Atlanta could boast the busiest airport in the world and more U.S. headquarters of Japanese firms than any other city except Los Angeles and New York. The Chamber of Commerce was no longer concerned that Gone With the Wind was the only thing the world associated with the region.

Summary

Going back to the foundation of the city, Atlanta has relied upon its physical location as a critical economic advantage. Both its geographic location and its climate have attracted industrious businessmen. However, the success of the region was by no means assured, as many other competitive regions offered similar locational advantages. Its government, private sector, and academic leaders have made critical decisions that supported the growth of the region.

Atlanta is a place where great leaders have made great things happen. Unfettered by strong legal or social regulations, Atlanta is a place where people with big dreams could attempt to realize them. Furthermore, it is a place that seems to attract and nurture dreamers.

A culture has developed in the region that encourages entrepreneurs—social and business, native and newcomer—to pursue their opportunities. The boosterism of Atlanta helps support winners, so long as they support Atlanta. When motivated, the community supports massive civic projects like Forward Atlanta or the Olympics. As one interviewee said, "Atlanta has self-fulfilling prosperity." Community leaders believe that they can solve any problem—racial differences, weak business infrastructure, or the lack of international notoriety.

Exhibit 26: Building a Competitive Region in Atlanta

Historical Obstacles	Important Enablers	Key Events
■ Lack of image as a cosmopolitan business center	■ Good quality of life and geographic location	■ Railhead and Interstate Highway construction
■ Racial division and tensions	■ Strong transportation and communication infrastructure	■ Construction of Hartsfield Airport
■ Poor public secondary education system	■ Development of Georgia Tech and other regional universities	■ Forward Atlanta Program
■ Lack of local venture capital	■ State government education, training and technology development programs	■ Implementation of civil rights reform without meltdown (as opposed to Birmingham)
■ Lack of local specialized support services	■ Established base of large successful corporations	■ Committee of 20/ATDC
	■ Early success of entrepreneurial firms/mentoring of new firms	■ Loss of Sematech and MCC consortia
	■ Civic pride and leadership	■ Creation of the GRA
		■ Passage of Lottery Bill/Creation of HOPE Scholarships
		■ Mindspring success
		■ Olympics

Atlanta is a place that personalizes the dreams. In Atlanta, everybody associates the efforts with the individuals, not the movements. People talk about Billy Payne's Olympics, Ted Turner's CNN, Maynard Jackson's airport expansion, Tom Cousins' real estate empire, Bob Woodruff's CocaCola, John Portman's glass elevators, Governor Miller's Hope Scholarships, and Martin Luther King Jr's Dream. The economic history of Atlanta proves King's comment that "people cannot devote themselves to a great cause without finding someone who becomes the personification of that cause."

The combination of a laissez-faire business environment, economic and policy entrepreneurship, personalized leadership, and state-supported economic development are critical facets of the historical success Atlanta has enjoyed. These traits have seeded remarkable economic growth and are worthy of study by other regions seeking to develop successful economic development strategies (see Exhibit 26).

RECENT ATLANTA REGIONAL ECONOMIC PERFORMANCE

The Atlanta economy does well in most measures of economic performance. It has high employment, good levels of productivity, and rising levels of exports and wages. In 2000, Plants, Sites and Parks magazine called the region the best in the United States for business relocation. Fortune magazine called it the second best place to do business in the United States. The region is home to 11 Fortune 500 headquarters, and regional entrepreneurs have successfully established an impressive number of high-growth firms. Yet, even with its growth in just about every performance measure, Atlanta still lags other major metro areas in many measures of innovation output including patenting, initial public offerings, and venture capital (VC).

The trends in innovation output are positive through 2000; however, the recent economic downturn has slowed the VC inflow into the region and hurt many of the start-ups that had been flourishing. Government initiatives, like the Yamacraw Project and the Intellectual Capital Program (ICAPP), are aiming to provide stability in a weak national economy.

Exhibit 27: Atlanta Economic and Innovation Indicators

Source: Bureau of Labor Statistics; Bureau of Economic Analysis; International Trade Administration; U.S. Patent and Trade Office; Price Waterhouse Cooper Money Tree; Hoover's IPO Central; Inc. Magazine; Fast Forward, Inc.; Baker Thompson Associates

Indicators of Overall Economic Performance

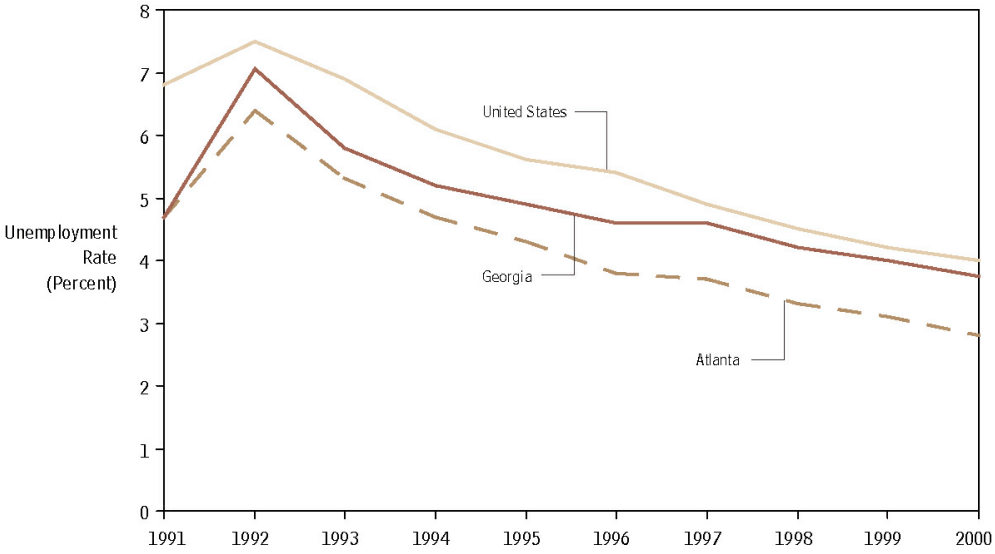
To assess the overall economic performance of Atlanta's regional economy, we compare it to the nation and several benchmark regions on the following metrics: employment, average wages, and exports (see Exhibit 27).

Employment. The Atlanta economy has performed well in terms of employment growth over the last decade. The number of civilian employees in 2000 was 2.3 million, up from 1.7 million in 1990.[20] From 1990 to 2000, the compound annual rate of growth of civilian employment in Atlanta was 3.2%, almost doubling the national growth rate of 1.7%. From a high of 6.4% in 1992, the Atlanta unemployment rate hit 2.8% in 2000. For the last decade, unemployment in Atlanta has been significantly below both State of Georgia levels and the U.S. levels. According to the U.S. Department of Labor, Atlanta created more jobs than any other region in the United States over the decade.[21] (see Exhibit 28).

Average Wages. The average wage in Atlanta in 1999 was $35,382, about 10% above the national average of $32,100. Wage growth from 1990 to 1999 was 4.5%, slightly faster than the national growth rate of 4.0%. Overall, the region ranked 28th of 318 U.S metro areas in average wages. In 1990, Atlanta ranked 36th.

For traded industries, which tend to pay higher wages, the 1999 index of Atlanta average wages to U.S. average wages was 101, or 1% above the national average.[22] Five of Atlanta's ten largest clusters paid wages

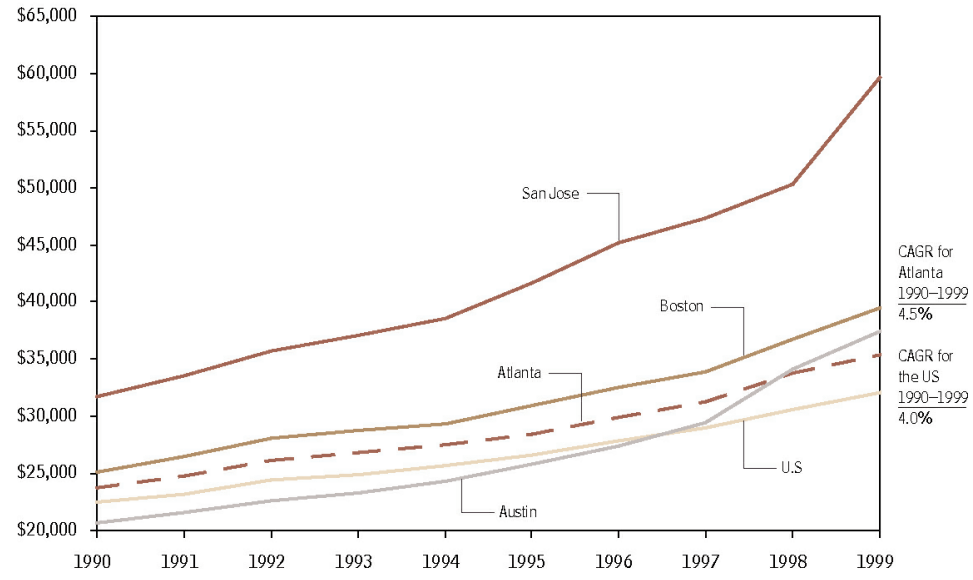
Exhibit 28: Unemployment Rates in Atlanta, Georgia and the United States, 1990-2000



Source: U.S. Bureau of Labor Statistics

higher than the national average for that cluster. Distribution services, a cluster that consists primarily of product and service wholesalers, offered the highest relative wage –17.5% over the national average.[23] Other relatively high paying clusters with significant employment in the Atlanta region include processed food, apparel, and information technology. All of these clusters paid wage rates over 12% of the national average for their cluster.

Exhibit 29: Average Wages of Selected Regions, 1990-1999



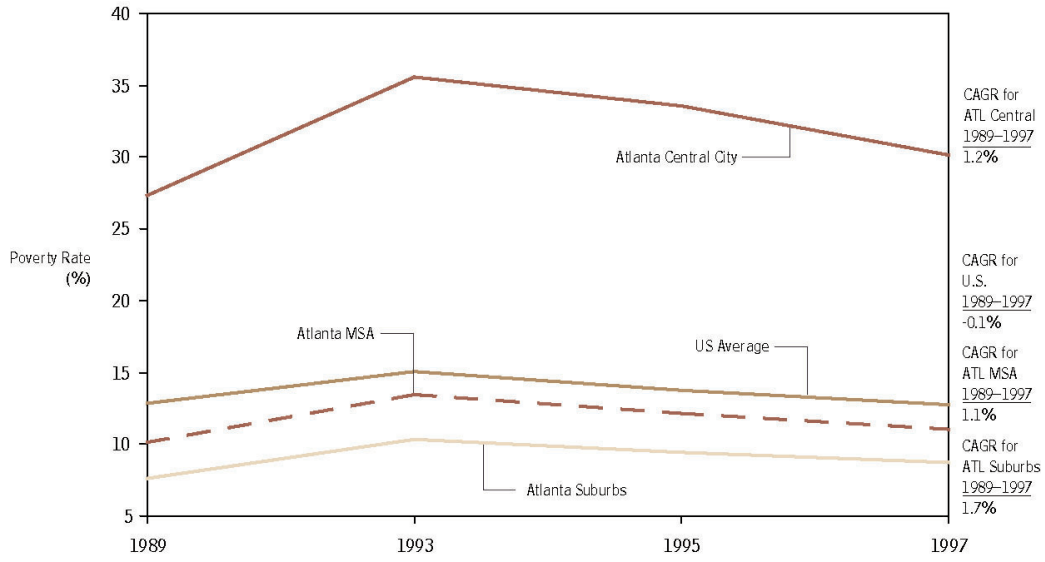
Note: Average wages are nominal
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Cost of Living. According to Baker Thompson and Associates estimates, the cost of living in Atlanta is approximately 10 to 20 percent higher than the average U.S. metro area. The same report shows that the wage increases received by Atlanta workers have not kept pace with rising costs of living. The gap between wage and living costs has increased from 1993 to 2000 across all salary levels, with lower paid workers seeing the largest decrease of their standard of living.[24]

Most of the cost of living increase is found in higher lodging costs. Since at least the 1940s, affordable housing has been a particular area for concern in Atlanta. During the mid-century, the problem was primarily one of racial segregation. Today it has been created by economic segregation as land values price middle-income families out of desirable urban and suburban neighborhoods. In 2000, housing costs in the City of Atlanta were an estimated 65% percent higher than the national average. From 1995 to 2000, the average sale price of a 2,200 sq. ft executive house in central Atlanta rose from $131,000 to approximately $271,000. This increase significantly exceeds the national growth in home prices of about 6% a year. Costs of apartment rentals (using a 900 sq. ft. apartment as a base) were also more than 60% higher than the U.S. average. These figures are somewhat offset by the massive growth of the region. In the outlying areas of the region, housing costs are typically much lower; however, the financial and temporal costs of commuting increase.[25]

Atlanta, as a region, has not solved the problem of persistent poverty despite its growth. The Department of Housing and Urban Development estimates that poverty increased slightly in the Atlanta region from 1989 to 1997 (see Exhibit 30). Even if this trend was reversed later in the decade, it is clear that the prosperity created by the economic boom has not reached all of the region's citizens. Atlanta is no different than many other areas in this regard, though the challenge it faces may be tougher than most, given its historically high rates of poverty in the central city.

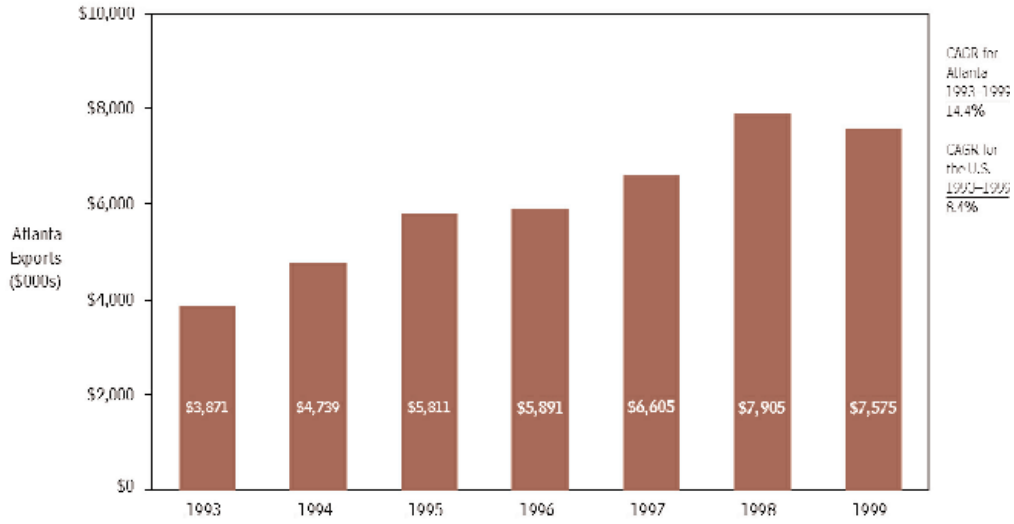
Exhibit 30: Poverty Rates in the Atlanta Metro Area, 1989-1997



Note: 1993, 1995, and 1997 are estimated data
Source: U.S. Department of Housing and Urban Development, State of the Cities Database

Exports. Exports from Atlanta were $7.6 billion in 1999. The region has seen very strong export growth over the past six years, despite a minor decline from 1998 to 1999 (see Exhibit 31). The region's rate of growth, 14.4 %, was nearly 75% higher than the U.S average.

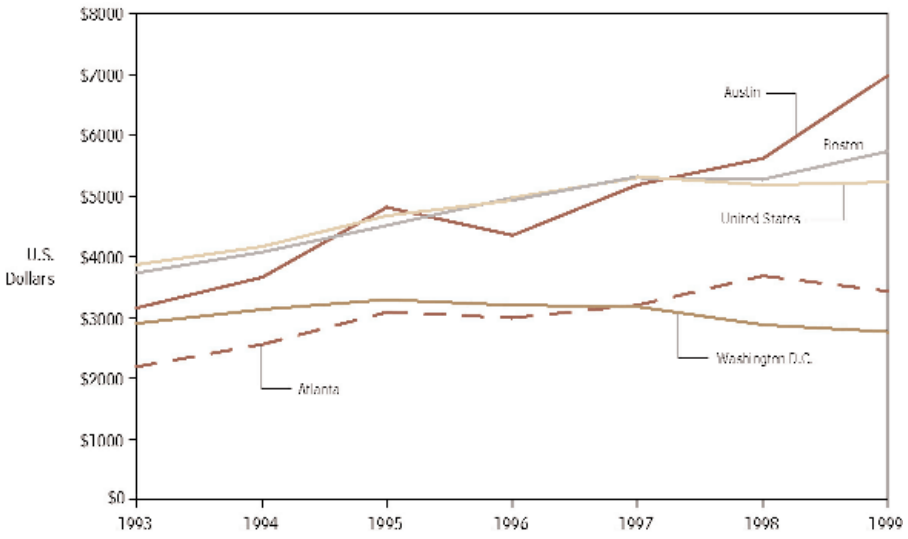
Exhibit 31: Atlanta Exports, 1993 to 1999



Note: Includes official Atlanta MSA counties only.
Source: U.S. Department of Commerce, International Trade Administration

However, when viewed in comparison to the rest of the country, Atlanta is still playing catch-up. On a per-civilian-employee basis, Atlanta is still exporting significantly less than the U.S. average. (See Exhibit 32) In 1999, Atlanta regional firms exported slightly greater than $3,400 per worker, while the U.S. average was near $5,200 per worker. Other regions like Austin and Boston, with their strong technology exports, started below the U.S. average and surpassed it, reaching $6,969 per worker, and $5,734 per worker

Exhibit 32: Atlanta vs. Comparison Regions: Exports per Worker, 1993 to 1999



Source: U.S. Department of Commerce, International Trade Administration

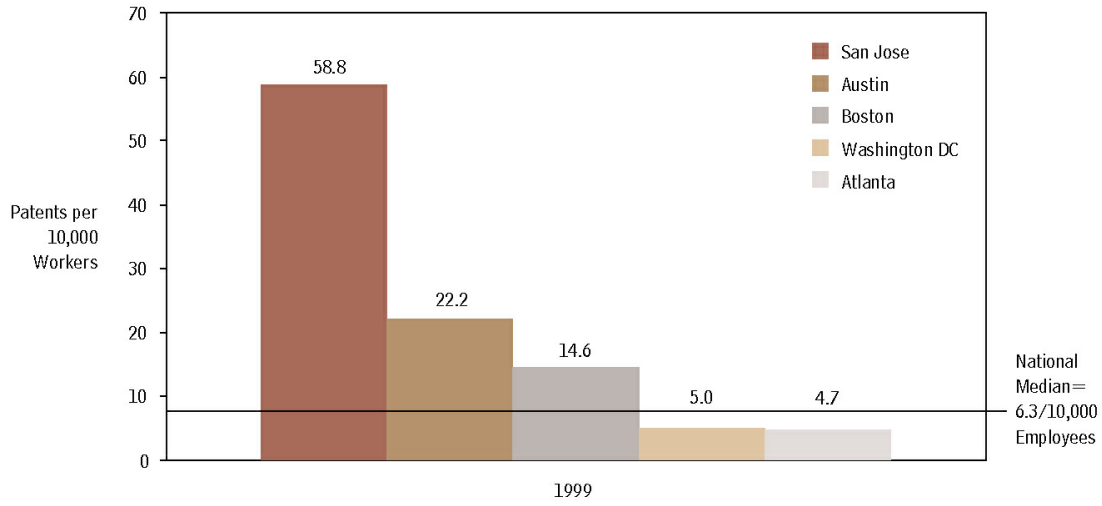
respectively. Since the value of exports in a region can be influenced by many factors, particularly the industrial mix and average value of the product, Atlanta should be justifiably proud of its impressive export growth. Still, the absolute level of Atlanta's exports per worker signals that Atlanta has room to improve even more.

Indicators of Innovation Output

To assess potential future competitiveness, we examined measures of innovative output and entrepreneurship and compared Atlanta to the nation and benchmark regions in the following metrics: patents, venture capital investments, the prevalence of fast-growing companies, and initial public offerings. Patents measure early stage innovation, whereas venture funding, firm establishments, fast growth firms, and IPOs measure innovation at successively later stages. The Atlanta economy has shown a mixed degree of innovation output over the last decade, with low levels of patenting but impressive levels of firm growth.

Early Stage Innovation: Patent Registration. From 1993 to 1999, the most recent year for which data are available, inventors in Atlanta registered 1045 patents, ranking the region 24th among U.S. metro areas (see Exhibit 33). Atlanta produced 4.7 patents per 10,000 workers, below the national average of 6.3, and well behind competitor regions like Boston (20.9) and Austin (22.2).

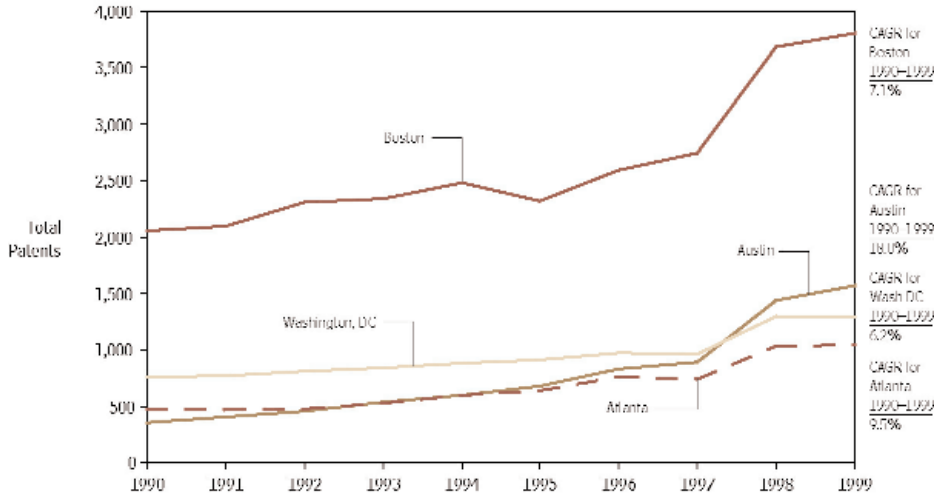
Exhibit 33: Patents per Worker, 1999



Source: U.S. Patent and Trademark Office

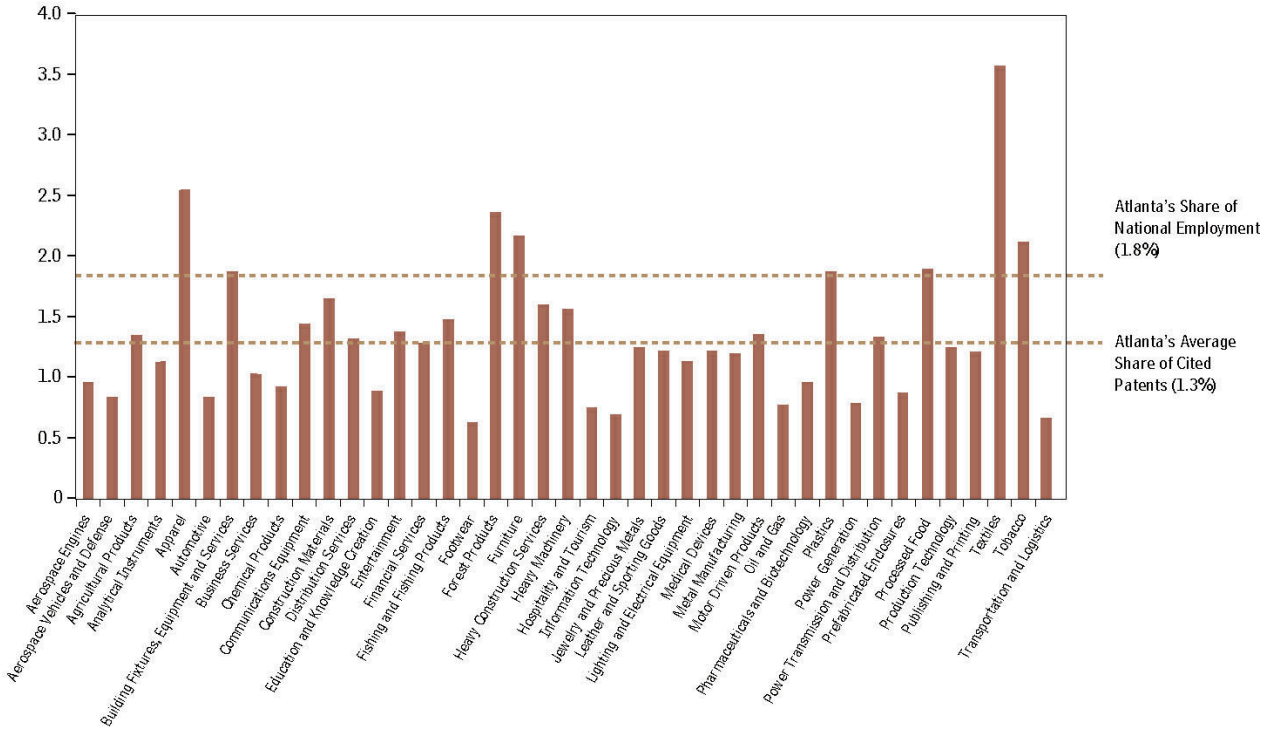
As with regional exports, Atlanta patenting is on the rise. Its annual patent growth rate of 9.5% was eighth fastest among the 20 largest patenting regions. It was faster than the national rate of 6.6%, and Boston's rate of 7.1%, but significantly trailed Austin's 18.0% (see Exhibit 34 on next page).

Exhibit 34: Total Patents per Region, 1990-1999



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Exhibit 35: Percentage Share of Cited Patents in the Nation by Cluster, 1998

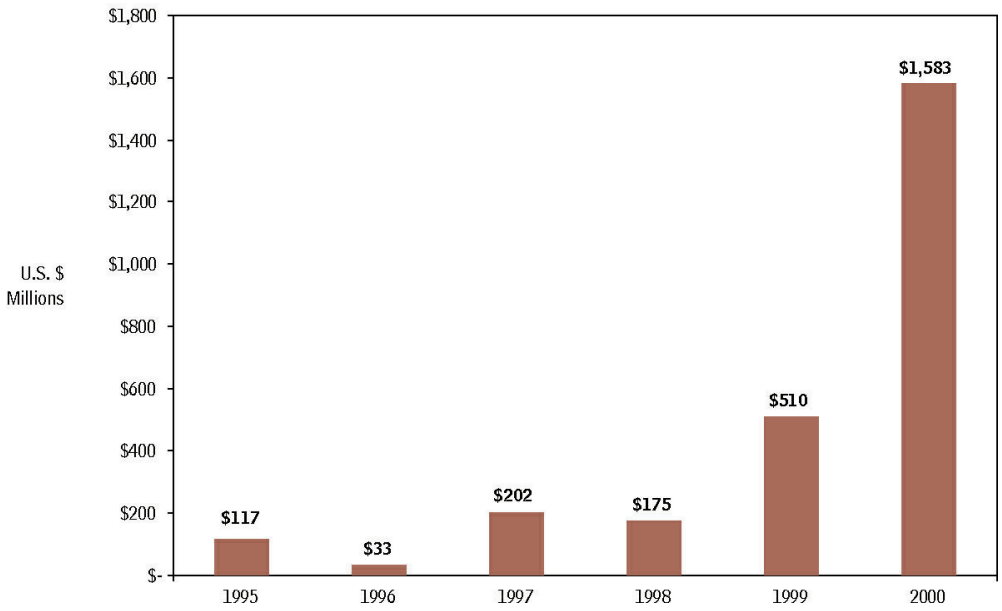


Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

To measure the quality of patents, we look at the number of patents cited in other patent applications. Atlanta's traded clusters have a relatively low percentage of quality patents (see Exhibit 35). The MSA has 1.8% of the nation's employment in traded industries, but only 1.3% of cited patents in traded industries in 1998. The region is under-performing expectations in this case. It is interesting to note that the clusters with the most cited patents are often considered to be "old economy" businesses like textiles, apparel, and wood products. It is a positive sign that the region is leading the country in cited patents in these sectors that will require continuous innovation to compete against international competition. Atlanta faces a greater challenge in some of the newer industries, but its relatively low patent and cited patent rates may be a partial consequence of the relatively new appearance of these clusters in the Atlanta region.

Venture Capital Funding, Firm Establishment, Fast Growth Firms, and IPOs. From 1995 through the third quarter of 2000, PriceWaterhouseCoopers reported that Atlanta firms received $2.6 billion in venture capital (see Exhibit 36). The vast majority of the venture capital investment took place in 1999 and particularly 2000, when Atlanta metro area firms received more than $1.5 billion in only the first nine months of the year. The software and business service sectors received the most attention from venture investors. In 2001, VC investments have slowed along with the decline of Internet businesses.

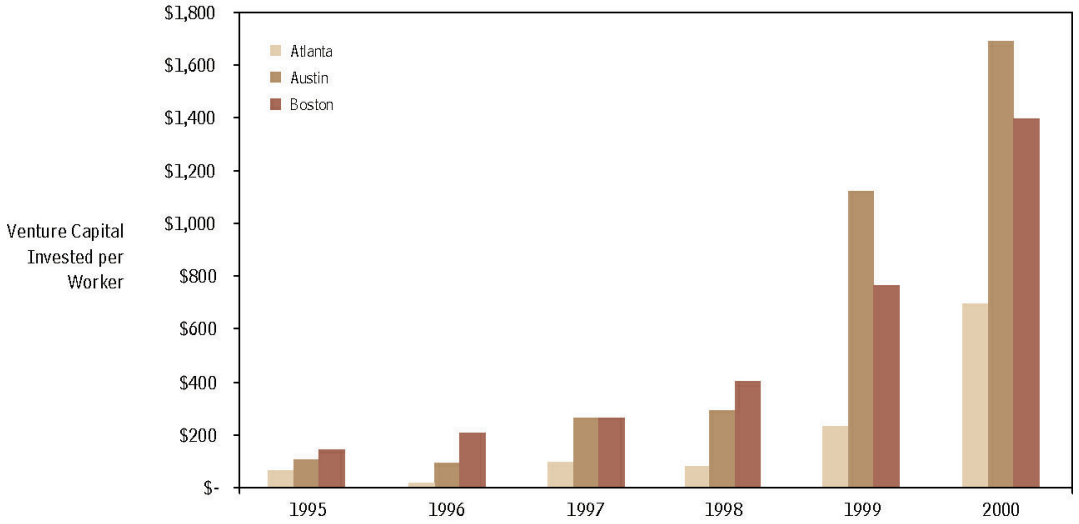
Exhibit 36: Atlanta Regional Venture Capital Investments, 1995 to 2000



Note: 2000 figures only through third quarter
Source: PriceWaterhouseCooopers Money Tree Survey

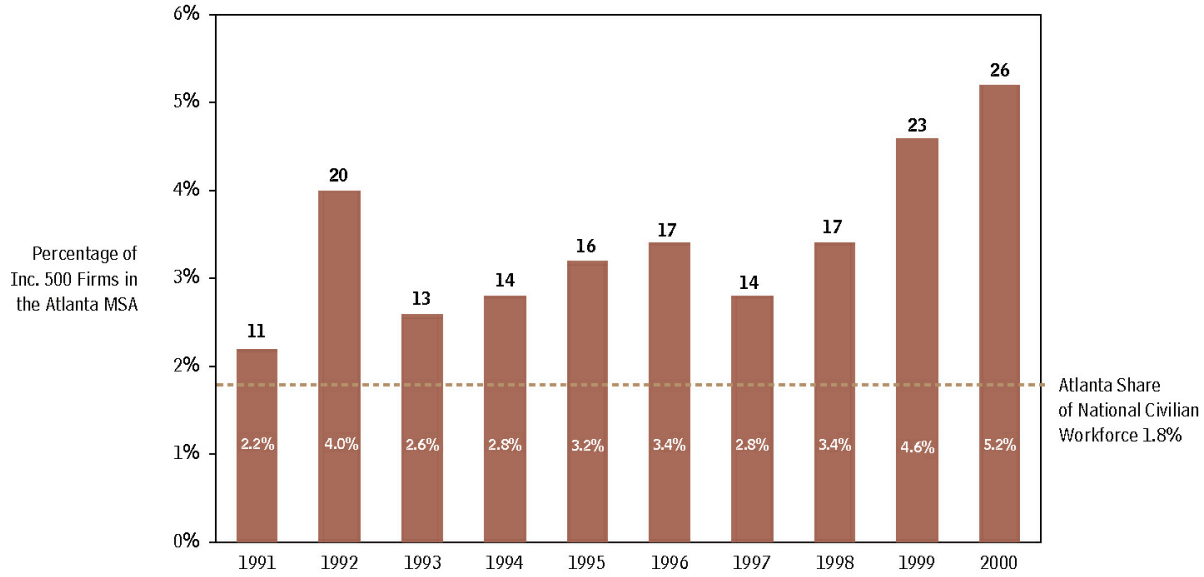
Despite the recent market-driven slowdown, Atlanta's venture growth remains very impressive and represents both new investments by firms outside of the region and increased funding by local VCs. Atlanta's $695 of VC investment per civilian worker in 2000 is close to two-and-a-half times the national average of $266 per worker (see Exhibit 37 on next page). However, as in other measures, Atlanta lags other leading "new economy" regions such as Boston ($1,395 per worker) and Austin ($1,690 per worker).

Exhibit 37: Regional Venture Capital Investments by Workforce, 1995 to 2000



Note: 2000 figures only through third quarter. The San Jose MSA led the nation with over $14,000 in VC/worker
Source: PriceWaterhouseCooopers Money Tree Survey; U.S. Bureau of Labor Statistics

Exhibit 38: Percentage and Number of Inc. 500 Firms in the Atlanta MSA, 1991-2000



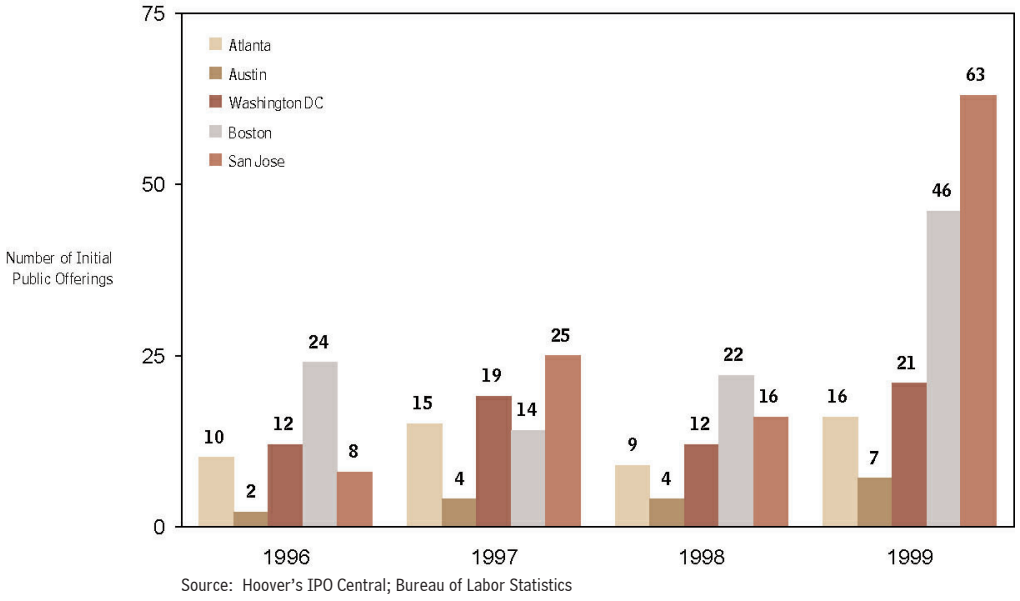
Source: *Inc. Magazine*

Both venture backed and non-venture backed small firms have been growing quickly in the region. Exhibit 38 shows the percentage of Inc. 500 companies in the Atlanta MSA on the vertical axis (exact number at top of bar). Over the past ten years, Atlanta has consistently outperformed its expected share of fast growth firms based on its employment size. In 2000, the region landed 26 firms on the Inc list, over 5% of the total in the country.

Another report, commissioned by the National Commission on Entrepreneurship (NCOE), shows similarly strong results. According to the NCOE Growth Company Index, Atlanta was fifth in the nation in terms of its concentration of high employment growth companies.[26] Approximately 6.5% of companies operating in 1997 had shown employment growth approximating 15% a year over the previous five years. In terms of overall establishment growth in traded industries, Atlanta, with nearly 55,000 establishments, more than doubled its total over the decade.

Fifty Atlanta regional companies went public from 1996 to1999, more than their competition in Austin, but behind leading regions like Boston—which had 106 IPOs"—and Washington, D.C—which had 64 (see Exhibit 39).

Exhibit 39: Number of Initial Public Offerings per Region, 1996-1999



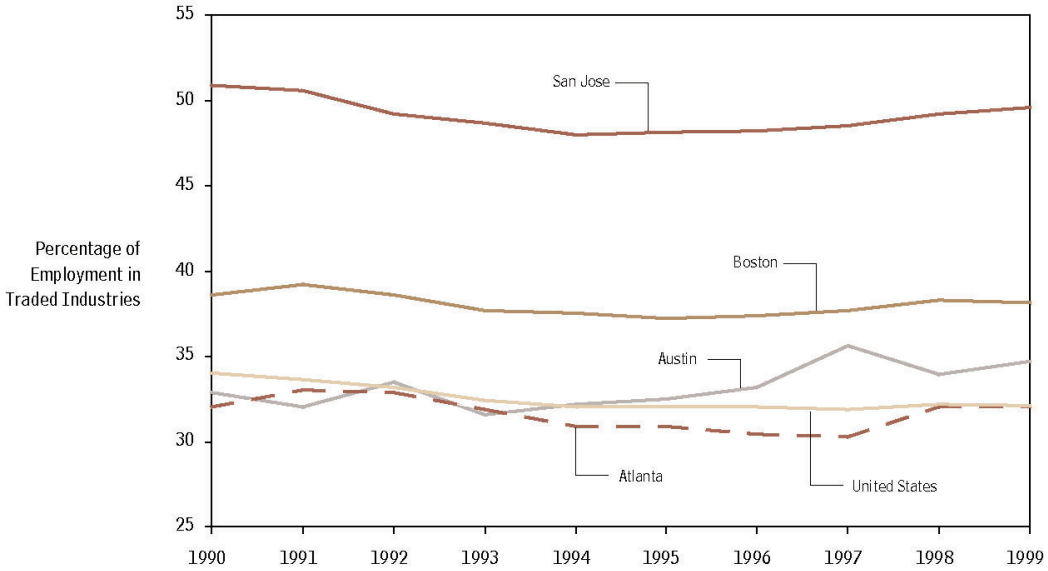
Source: Hoover's IPO Central; Bureau of Labor Statistics

COMPOSITION OF THE REGIONAL ECONOMY

Atlanta has a diverse economy, which, through early 2000, has seen significant growth across a broad number of sectors. The region benefits from having the international headquarters of blue-chip companies like Delta Air Lines, Home Depot, and Georgia Pacific. It is home to major regional operations of worldwide firms like IBM, Lucent, and Phillips Electronics. Its position as the business services hub for the Southeast is uncontested. In recent years however, employment growth in small companies, many in emerging technology fields, has been spurring regional development.

Overall Economy. The economic structure of Atlanta today is characterized by its great breadth. Atlanta has diversity in both its large companies and small firms. Its 11 Fortune 500 company headquarters represent 11 different industries (see Exhibit 41). The largest clusters also represent a variety of different sectors, ranging from transportation and logistics to financial services. Both traditional large clusters, like transportation and logistics and construction, and relatively new clusters like information technology, have grown.

Exhibit 40: Percentage of Employment in Traded Industries, 1990-1999



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Employment in higher-paying traded industries did not change from 1990 to 1999, with 32.0% in each year.[27] However, the end figures mask a recent uptick in traded employment as indicated in Exhibit 40. From 1997 to 1999, traded employment has grown as a percentage regional employment, making up for losses in the mid 1990s created by defense cuts and the offshore relocation of textile plants. Newer industries characterized by smaller firms like software development and computer programming have generated major employment gains.

Exhibit 41: Fortune 500 Headquarters in Atlanta Region, 2001

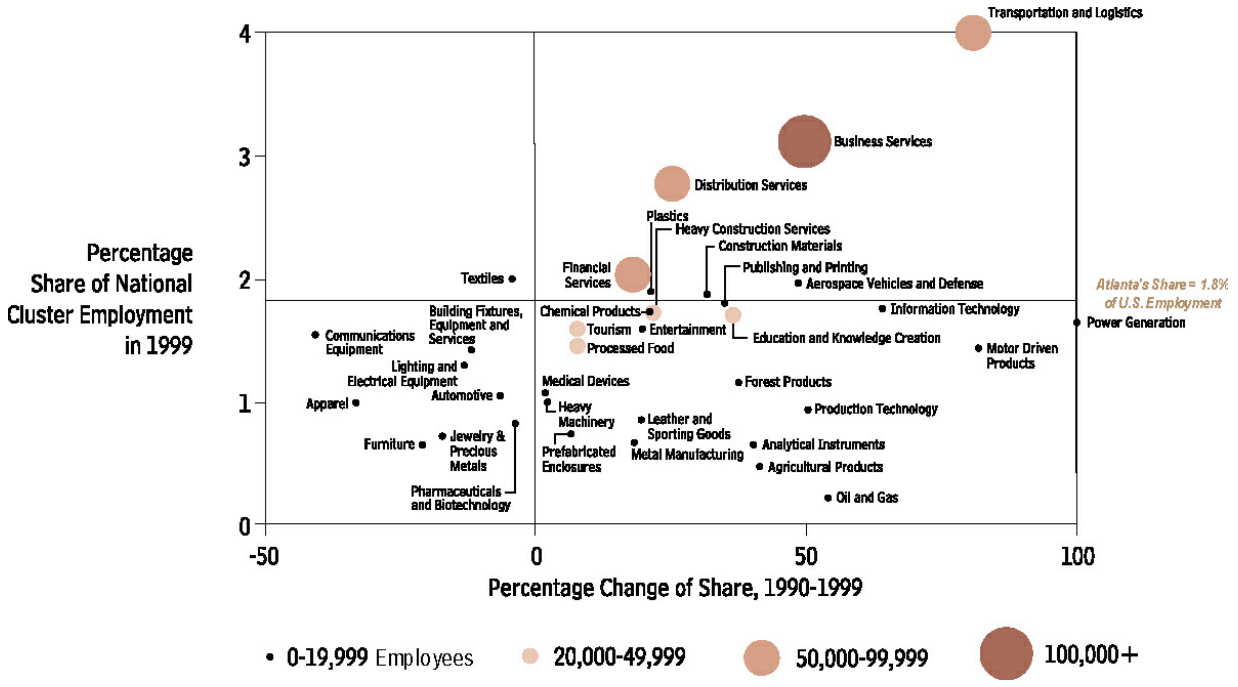
Home Depot (Retail)	23
United Parcel Service (Package Delivery)	52
BellSouth Corporation (Communications)	66
Southern Company (Energy)	76
Georgia Pacific (Wood Products)	84
The CocaCola Company (Food and Beverage)	93
Delta Air Lines (Airline)	123
CocaCola Enterprises (Beverage Bottling and Distribution)	128
SunTrust Banks (Bank)	221
Genuine Parts (Vehicle Parts)	229
Cox Communications (Media)	466

Source: Fortune Magazine/Atlanta Journal Constitution analysis

Manufacturing within the Atlanta metropolitan area has declined from 19% of total employment in 1970 to 11% in 1990 and only 9% in 1998.[28] This decline follows national trends toward an increasingly service-based economy and reflects the increasing cost of business in major metro areas. However, the "exurban" areas around Atlanta provide Atlanta-based companies with access to significant manufacturing resources. Nearly 28% of these counties' employment is in manufacturing industries.[29] Some urban manufacturing operations have reestablished themselves just outside of the suburban core of the Atlanta MSA.

Clusters. Exhibit 42 shows Atlanta's employment share and growth in the 41 traded clusters in the United States economy.[30] Atlanta has 1.8% of total national traded cluster employment, and this is the point at which the horizontal axis crosses the vertical. Clusters above the horizontal axis are relatively concentrated in Atlanta, and clusters to the right of the vertical axis have grown from 1990 to1999. The upper right quadrant represents clusters in Atlanta that have a relatively higher share of national employment and are growing in share of national employment. In Atlanta, 52% of traded industry employment is in the upper right quadrant, a good sign for future growth potential.

Exhibit 42: Composition of the Atlanta Economy by Traded Cluster, 1990-1999

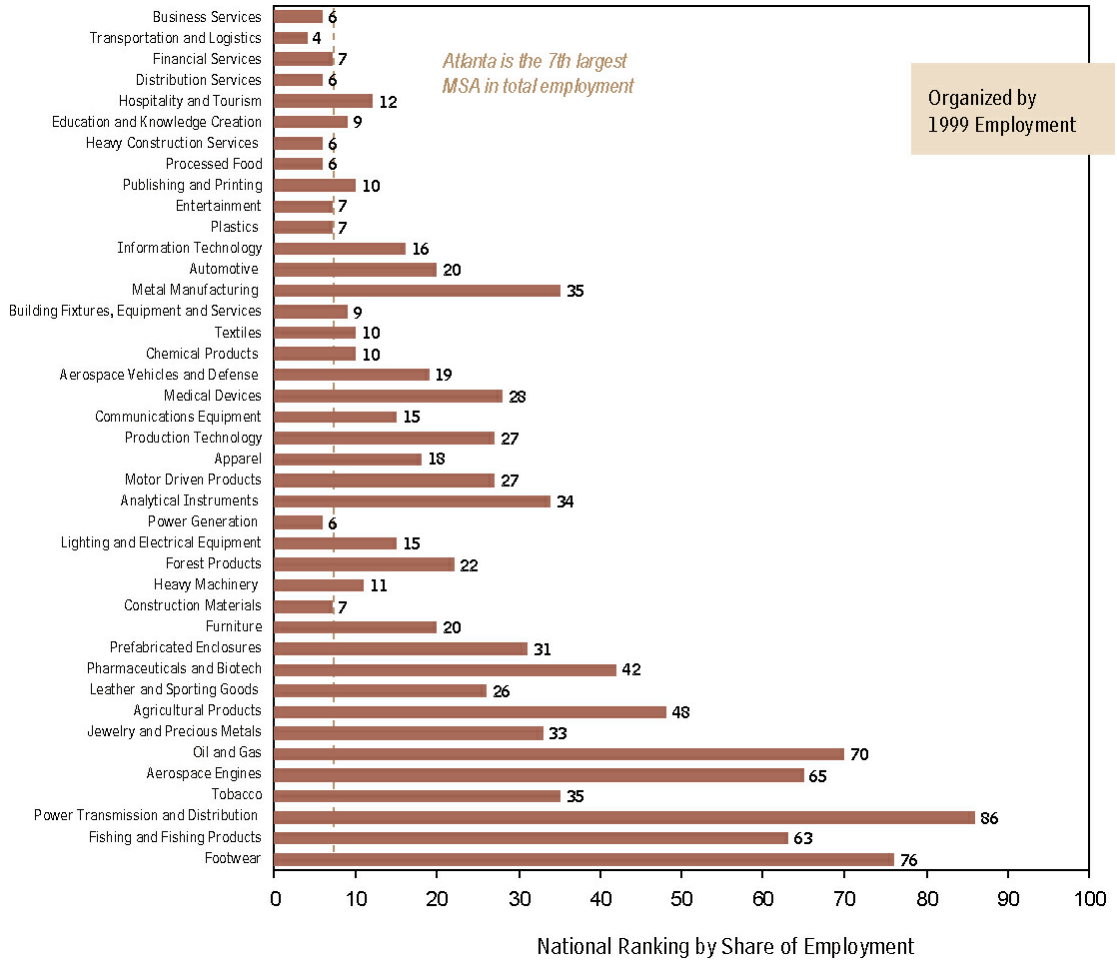


Note: Narrow Cluster Definition. Only unique industries in clusters are measured.
Source: Cluster Mapping Project at Institute for Strategy and Competitiveness, Harvard Business School

Exhibit 43 shows the national ranking in terms of percentage share of national employment of each of Atlanta's clusters. In 1999, Atlanta was the seventh largest MSA, and it ranked in the top seven in ten out of 41 clusters in terms of share of national employment in those clusters.[31] In only one cluster—transportation and logistics—is Atlanta in the top five regions nationally for total employment. The region has great breadth, but lacks a national leading position in any particular cluster.

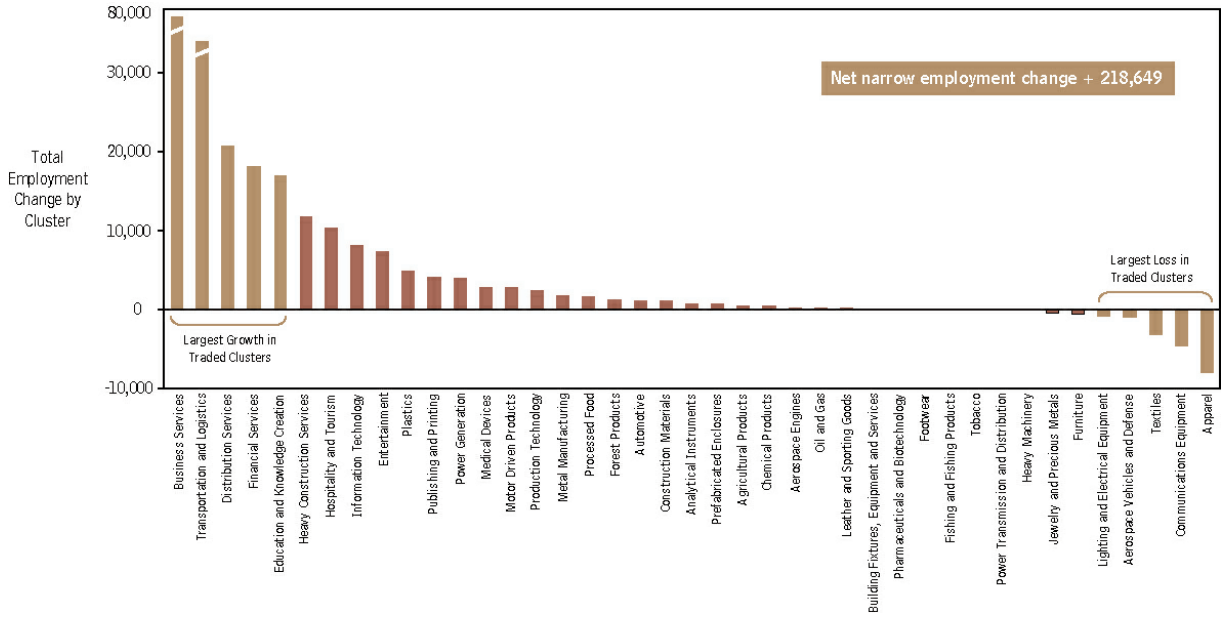
Exhibit 44 shows the growth and decline in employment in Atlanta's traded clusters from 1990 to 1999. The net gain in employment in "narrow" traded clusters over the period was 218,649 jobs. While jobs were created every year over the period, the second half of the decade showed particularly strong growth with the increase in distribution services, business services, and financial services.

Exhibit 43: Rank of National Employment Share by Cluster, 1999



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Exhibit 44: Employment Growth and Decline by Cluster, 1990 to 1999



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

COLUMBUS, GEORGIA Overview

Columbus, Georgia, located 90 miles southwest of Atlanta, is undergoing an economic transformation and trying to define its new commercial identity within the greater Atlanta region. Built along the Chattahoochee River banks, Columbus was established as a city in 1828. Relying on the river to support commerce, the community developed into an important commercial center, particularly for the textile industry in the 19th century.

In 1918, the U.S. Army located its Infantry School just south of town, establishing Fort Benning. Today, Fort Benning is one of the largest Army bases in the country and serves as an economic stimulus for the region, both through its use of local services and by providing skilled workers (service people's spouses and Army retirees) to the local labor pool. Even prior to the establishment of Fort Benning, the area had been a manufacturing center for both military and non-military hard goods.

Textiles and small manufacturing plants supported the region's civilian economy throughout the 20th century, but within the last 20 years, both industries have suffered significant job losses to overseas and other low-cost competitors. Today, Columbus still supports some manufacturing (ranging from charcoal grills to aerospace engines) and textile production is still the largest employer, though employment has declined by more than 2000 jobs in the decade. Driving growth in the civilian economy have been two international financial service companies, Synovus and AFLAC, and to a lesser degree, the healthcare, business services, food production, and tourism industries.

Economic Indicators

Total employment in the Columbus metro area in 1999 was nearly 104,000 and grew at 2.4% over the decade, faster than the U.S. average. Average annual wage growth in Columbus slightly outpaced the national average 4.1% to 4.0%; however, average wages in the region in 1999 were only $25,430. This was only 79% of the national average and 84% of the Georgia average. Still, over the decade the regional average wage grew fast enough to move Columbus up 50 spots (to 205th), compared to the nation's 318 metro areas.

In terms of innovation, the region patented at slightly higher rates than the average U.S. region. In addition, regional firms, led by Synovus and the American Family Life Assurance Company (AFLAC), have developed a reputation for innovation in product development and marketing. The regional government has a tradition for innovation stemming back to the successful effort by political leaders to create a consolidated city-county government in 1971. To date, Muscogee County is the only county in Georgia to have a consolidated government, a form that has allowed it to avoid many of the regional issues facing Atlanta and other larger metro areas in Georgia. The Columbus Chamber of Commerce and the City of Columbus have been very active in marshalling community support for economic development efforts. A recent success, the attraction of the 1996 Olympic Softball championship, required the development of a new field complex, but has helped Columbus develop minor league and collegiate sports as an economic development engine.

Columbus offers the benefits and drawbacks of being a smaller region. Housing prices are lower, traffic jams are uncommon, and style of life is more relaxed than larger cities like Atlanta. However, the Columbus region has trouble in attracting and maintaining younger citizens, who often head to Atlanta in search of greater social and cultural amenities and broader job opportunities.

Economic Composition: Financial Services

While Columbus maintains a reasonably diverse economy, its financial service sector has been the engine of growth in recent years. Thanks primarily to two home-grown companies, Synovus and AFLAC, Columbus has developed into a major financial services and business service hub. Together, these two firms employ close to 10% of the Muscogee County workforce, and are both major contributors to civic efforts.

Synovus Financial Corp. started as Columbus Bank and Trust, a regional bank serving Southeastern Georgia. Today, Synovus is a $16 billion financial service holding company, with banks, brokerage, and insurance companies as well as its largest holding, TSYS, a global leader in electronic payment and credit card processing. TSYS's proprietary software system for electronic transaction processing, T2, is the most utilized in the world. Its clients include leading international banks, Visa, the largest credit card issuer in the world, and major retailers who maintain their own branded credit cards. The firm has offices throughout Europe, North America, South America, and Asia. In Columbus, Synovus has close to 6,000 employees including its corporate leadership, software programmers, and largest processing center staff.

American Family Life Assurance Company of Columbus (AFLAC) traces its roots back to 1955, when brothers John, Paul, and Bill Amos founded the company in Columbus. Its first big product, cancer expense insurance policies, a form of supplemental insurance, helped the company expand nationally in the 1960s and 70s from its Southeastern base. Today, it provides a variety of supplemental insurance products through employers in all 50 states.

However, AFLAC is even larger in Japan. Since 1974, AFLAC has been selling insurance products in Japan, and today is the second largest and most profitable insurance company in the country. It insures one in four Japanese families. In Columbus, still AFLAC's headquarters, the company employs more than 2,000 workers.

In addition to these two leaders, Blue Cross/Blue Shield of Georgia has a major processing center in Columbus that employs approximately 800.

These large corporate employers are clearly a major boon to the region. Because of the existence of these financial processing operations, some in the region have called Columbus "back-office to the world."

But this name indicates one of the challenges facing Columbus. Not many people know the region has a concentration of financial service companies. Similar to the lack of recognition faced by the duck in the award-winning AFLAC television ads, few international executives recognize the city by name. Columbus runs a fine line between wanting to be considered part of the Atlanta region as it did for the Olympics, and developing its own international reputation. Its challenge is to maintain its high quality of life while creating a business environment that leverages Atlanta's international position.

A deeper challenge is for the region to build a broader financial services cluster in the region. TSYS and AFLAC could be large anchor companies, but as it turns out, many of their suppliers are based outside of the region. Due to the fact that most of their requirements can be provided digitally, there is less of a requirement to have local providers, but locating nearby should be attractive to at least some firms. A larger opportunity may be in attracting TSYS clients, credit card issuing institutions, to establish regional offices. To date, at least one bank has done so, but the overall impact has been small. The workforce in Columbus, which now has a large corps of legacy system computer programmers and call center operators, is also a great asset that can be utilized.

Source: Company Websites, Columbus Chamber of Commerce, Project interviews

Exhibit 45 on the next page, shows employment and wage data from the "core" industries of the 20 largest clusters in Atlanta.[32] All but three of the largest clusters in Atlanta have seen employment growth over the decade. However, only eight of them pay wages over the national average for the cluster.

This exhibit again highlights the relative weakness in patenting innovation of Atlanta, with only five of the clusters having a higher per capita patenting rate than the national average. The clusters that do patent higher than their national counterparts tend to be concentrated in more "traditional" manufacturing industries like textiles, metal manufacturing, and processed foods. However, innovation may be improving as 14 of the clusters are increasing their patenting rate.

Eight of the largest clusters have been growing at or above the regional average. They have created 88% of the new jobs in traded industries in Atlanta from 1990 to 1999.[33]

Exhibit 45: Employment, Wage and Patent Metrics Industries for Atlanta's 20 Largest Clusters

Cluster	Total Employment 1999	Annual Growth Rate in Employment 1990–1999	Average Wages Indexed to Nation, 1999	Annual Growth Rate of Average Wage Index 1990–1999	Patents per Employee Indexed to Nation 1998	Patent Index CAGR 1990–1998
Business Services	132,967	10.0	104.5	-0.4	36.7	-3.9
Transportation and Logistics	65,666	9.7	98.8	-0.2	19.1	7.0
Financial Services	59,264	4.1	94.3	0.1	60.5	-8.2
Distribution Services	51,915	5.8	117.5	-0.3	56.9	2.2
Hospitality and Tourism	39,527	3.4	98.6	1.0	57.1	5.1
Education and Knowledge Creation	36,963	7.0	107.7	-0.6	43.6	-1.3
Heavy Construction Services	31,795	5.2	102.2	1.0	97.7	4.7
Processed Food	20,180	0.9	113.9	1.0	126.4	3.6
Publishing and Printing	17,434	3.0	95.8	-0.6	71.8	-0.6
Entertainment	15,878	7.1	85.6	0.3	65.0	-2.3
Plastics	15,060	4.3	90.6	-0.1	107.7	2.4
Information Technology	14,890	9.1	112.3	-0.4	55.3	3.7
Automotive	13,709	1.0	79.1	0.5	91.4	5.2
Metal Manufacturing	9,570	2.3	85.8	0.3	177.6	-1.0
Building Fixtures, Equipment and Services	9,292	0.1	98.4	0.7	113.7	3.6
Textiles	8,640	-3.4	109.7	0.5	189.1	11.7
Chemical Products	8,479	0.4	78.0	-0.9	58.4	4.0
Aerospace Vehicles and Defense	8,390	-1.2	N/A	N/A	46.0	11.7
Medical Devices	7,335	5.3	117.8	2.1	93.8	0.4
Communications Equipment	6,757	-5.6	85.0	-2.3	88.3	10.5
Clusters Outperforming National Average	—	—	8	10	5	14

Note: Narrow Cluster Definition
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Growth Industries in Atlanta. Exhibit 46 shows the ten industries in Atlanta that added the most jobs to the economy between 1990 and 1999. All ten of the industries are service industries, though there is significant variation in their composition. The air transportation growth has been driven by the expansion of Delta at Hartsfield Airport along with the emergence of other Atlanta-based airlines and airline service companies. The growth in computer programming services, computer wholesaling, and software reflects both the national and regional emergence of new technology industries. Management consulting and employment agency growth reflect growth in industries that accompany fast growth and new market opportunities. Increased college and university jobs reflect the commitment of public and private leaders to place Atlanta at the forefront of post-secondary education.

Exhibit 46: Ten Atlanta Industries with the Most Employment Growth, 1990 to 1999

Industry	Air Transportation, Scheduled	Computer Programming Services	Management Consulting Services	Colleges and Universities	Employment Agencies	Computers, Peripherals and Software-Wholesale	Engineering Services	Photocopying and Duplicating Services	Heavy Construction, Except Highway	Prepackaged Software
Clusters	Transportation and Logistics	Business Services	Business Services	Education and Knowledge Creation	Business Services	Analytical Instruments Distribution Services Education and Knowledge Creation Information Technology	Business Services Heavy Construction Services	Business Services	Heavy Construction Services	Aerospace Vehicles and Defense Analytical Instruments Communications Equipment Education and Knowledge Creation Financial Services Information Technology Medical Devices Publishing and Printing Transportation and Logistics
Change in Employment 1990 to 1999	28,037	13,762	13,130	13,077	11,915	9,973	7,114	6,707	5,515	5,306

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Declining Industries in Atlanta. Exhibit 47 shows a similar shift away from manufacturing toward services and knowledge creation. Of the declining industries, seven of the ten are manufacturing industries. Industries in the apparel and textile clusters, two particularly hard-hit clusters, are prominent, accounting for close to 15,000 lost jobs. In addition, the defense industry has shed jobs as national expenditures dropped in the Clinton administration. Also, the impact of financial institutions moving to lower-cost Charlotte and other locations is seen here in the reduction of core financial service jobs in the life insurance and savings institution industries.

Exhibit 47: Ten Atlanta Industries with the Largest Employment Decline, 1990 to 1999

Industry	Women's and Misses' Suits and Coats	Commercial Lighting Fixtures	Guided Missiles and Space Vehicles	Services, n.e.c.	Motor Vehicles and Car Bodies	Men's and Boys' Suits and Coats	Life Insurance	Nonferrous Wiredrawing and Insulating	Broadwoven Fabric Mills, Cotton	Savings Institutions
Clusters	Apparel Leather and Sporting Goods	Building Fixtures, Equipment and Services Lighting and Electrical Equipment	Aerospace Vehicles and Defense Communications Equipment	Business Services	Automotive Production Technology	Apparel	Financial Services	Communications Equipment Lighting and Electrical Equipment	Textiles	Financial Services
Change in Employment 1990–1999	-10,000	-5,770	-3,396	-2,501	-2,397	-2,373	-2,253	-2,130	-1,990	-1,750

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

REGIONAL COMPETITIVENESS AND INNOVATIVE CAPACITY

For decades, the Atlanta economy has been built on the use of abundant labor and land to support a variety of manufacturing and transportation industries. As the region prospered, it grew into the southeastern hub for many service industries, including financial services, education, and communications. Recently, the composition of the economy has been shifting more and more into knowledge-intensive, service-oriented, traded clusters. This section uses the diamond framework to assess regional innovative capacity, in order to explain shifts in the composition of the regional economy and determine the strengths and weaknesses that could impact future regional prosperity.

Some innovation factors affect the business environment of specific clusters, while others are important across all clusters in the region. This section focuses on the latter. In particular, we assess basic and specialized inputs (investment in R&D, skilled workers, quality of education, physical infrastructure, availability of risk capital, and quality of life), government policy, institutions for collaboration, and attitudes toward business.

Atlanta's primary strengths are its large pool of scientists and skilled workers, the state-supported higher education infrastructure, relatively attractive cost of living, and strong formal and informal business networks. These assets help explain the shift of employment into knowledge-intensive clusters. Factors having little positive effect have been the historically low supply of risk capital, a weak public K-12 educational system, and the lack of regional coordination on issues like traffic congestion and air quality. The main challenges for the future will be to preserve and improve the local quality of life in order to continue attracting human capital, to build regional government structures that are responsive to both business and environmental needs, and to ensure that primary and secondary school educational programs provide Atlanta's youth the skills they need to compete in the job market.

Basic and Specialized Factor Inputs

Physical Infrastructure. Throughout its history the geographic location and physical infrastructure of the Atlanta region have served as a strong economic assets. The region is well located far enough south to be a commercial hub for the southeastern states reaching all the way down to Florida and north enough to serve as a hub for cross-country road cargo and passenger air terminals. More than 200 million people, 80% of U.S. consumers, are within two hours' flight time from Atlanta, or one day's trucking by highway.[34]

Airport Infrastructure. Thanks to significant capital investments by the city, the state and Delta Air Lines, Hartsfield International Airport has grown to take advantage of the region's location. In 2000, it was the busiest airport in the world for passenger travel and handled more than 650,000 metric tons of cargo. Hartsfield has a $16 billion regional economic impact annually and 44,800 airport employees, making it the largest employment center in Georgia.[35] While some Atlanta leaders complain that parking at Hartsfield is difficult, most recognize that the airport, which supports more than 1000 daily flights, provides the region significant economic benefits.

World Class Communications Infrastructure. Atlanta has an excellent communications infrastructure, thanks to major investments made to support the Olympics and the major media companies like CNN and Cox Communications. Building on its reputation as a transportation hub, the region has also

become a major Internet connection hub. Leading ISPs, like Mindspring and BellSouth, offer services to take advantage of the high-speed Internet connectivity. Eighty-seven percent of our survey respondents said that the communications and Internet infrastructure fully satisfied their business needs.

The Economic Impact of the Olympics

The effort to win the Olympics in Atlanta was the brainchild of Billy Payne, a local lawyer. At first discounted by local leaders, Payne persisted in his effort and gained the support of the major corporations in town, the Chamber of Commerce, and then Mayor Maynard Jackson. The announcement in 1990 that Atlanta had defeated Athens for the Games led to weeks of celebration and was the impetus for significant state, regional, and national investments in infrastructure that continue to benefit the community today. Among the economic impacts were:

Direct Spending: Spending by out-of-state visitors at the Games amounted to $813,994,796. The Atlanta Committee for the Olympic Games (ACOG) had expenditures of $1,084,332,484.

Infrastructure Improvements: Hartsfield Atlanta International Airport gained a $300 million international air terminal, a $24 million atrium, and overall improvements exceeding $250 million. Other improvements included new sports arenas, downtown plaza restoration, and new housing at universities.

Business Attraction: Operation Legacy, which was launched in 1994 and disbanded in 1997, was founded to use the Games to attract business to Atlanta. Among Operation Legacy's goals was to develop 6,000 jobs for the region by the end of 1998. The group was about 900 jobs short of the goal as of June 1998.

International Awareness: The Olympic Games dramatically boosted awareness of Atlanta around the world. A 1997 Harris poll found that Atlanta was more highly regarded by CEOs as a place to locate a new facility than any other U.S. city, including Chicago, New York and Los Angeles.

Source: Atlanta Committee for the Olympic Games

Surface Transportation Infrastructure. The Atlanta road transportation infrastructure has not been able to keep up with the area's population growth. While the state has been actively building new roads throughout the decade, traffic and congestion have increased significantly.[36] According to the Texas Transportation Index, the average Atlanta driver experienced delays of 68 hours per year in 1997, fourth worst in the country. In 1990, the average Atlanta driver experienced only 27 hours of delay.[37] While Atlanta does have a rail transit system, MARTA, it presently only serves two counties in the 20-county metro area, too few to make a significant dent in the congestion.

Atlanta business leaders say that they sometime have trouble attracting workers from within the metro area because the traffic is so intense. As one business person said, " we have even lost employees simply because they moved from the northern suburbs to downtown."[38]

Sewer and Water Infrastructure. Growth in some communities has also outpaced the ability of the regional authorities to provide appropriate sewer services. According to a real estate executive, the problem is particularly acute in the Buckhead business district, where there are "five commercial buildings ready to come out of the ground waiting for the capacity to expand."[39] Parts of southwest Atlanta that lie well within the city limits are forced to rely on septic systems.[40]

While water has not been a significant problem to date, the State of Georgia is in a battle with Alabama and Florida over the flow from the Chattahoochee River. To date, Georgia has captured the quantity it needs, but due primarily the growth of the Atlanta region, the other states have not been able to access it.

Quality of Life. Interviewees consistently rate the Atlanta quality of life as a significant asset in developing the economy. Its warm weather, location near lakes, mountains and beaches, and its hub airport, make Atlanta more capable than most regions to attract and retain quality workers. More than any other factor, survey respondents cite quality of life as the main reason companies locate in the metro area.

Growth has both enhanced and detracted from the regional quality of life. Over the past decade, Atlanta has added new sports franchises, multiple new sports and entertainment venues, and museum expansions. There has been a concerted effort to revitalize downtown. However, increased traffic, pollution, and housing prices are real threats to the regional quality of life. Crime has been increasing after years of decline in the early 1990s. Survey and interview respondents suggest that protecting regional quality of life is one of the key priorities facing regional leaders.

A particular concern related to quality of life is the significant decline in air quality. According to the Environmental Protection Agency (EPA), in 1999, Atlanta had 61 days of unhealthy air quality, fourth among U.S. metro areas. From 1990 to 1999, the rate increased from 42 to 61 days, the third worst rise in the country.[41] It was the most consistently polluted major metro area in the country. In 1998, Atlanta became the largest metro area to have had its federal highway funds suspended due to inadequate air pollution control policies. While the funds were reinstated in 2000 with the EPA approval of the state's three-year improvement plan for air quality in Atlanta, the region is still struggling to implement clean-air policies.

The Georgia Regional Transportation Authority (GRTA), a new government agency created by Governor Barnes in June 1999, has been charged with crafting a regional transportation plan that both protects air quality and improves mobility. Through mid 2001, the GRTA has struggled to build the regional consensus necessary to implement a plan that serves both environmental and business concerns.

Georgia Regional Transportation Authority

In order to address the growing regional traffic and clean-air problems, Governor Roy Barnes, with the support of the Georgia Legislature, created the Georgia Regional Transportation Authority in June 1999. In the face of the federal Environmental Protection Agency's designation of 13 metro counties as violating the Clean Air Act, GRTA was designed to centralize authority for the mobility and air quality of the region.

In the view of the governor and state political leaders, the key challenge facing the region was the lack of coordination between county governments, despite the existence of the Atlanta Regional Commission (ARC), the regional council of government. As a result, GRTA was given veto power over Georgia Department of Transportation plans and the mandate to approve all ARC transportation plans as well as developing its own mass transit projects for the Atlanta area.

Despite its broad powers, the agency has had difficulties in moving forward. In the words of a June 2001 Atlanta Journal Constitution editorial, " …Many people hoped it (GRTA) would be able to leap hidebound bureaucracies in a single bound. Directed and staffed by mere mortals, however, GRTA has not worked miracles in its first two years. Given the magnitude of the mess, that's not surprising, even if the agency might have been quicker out of the gate."[42]

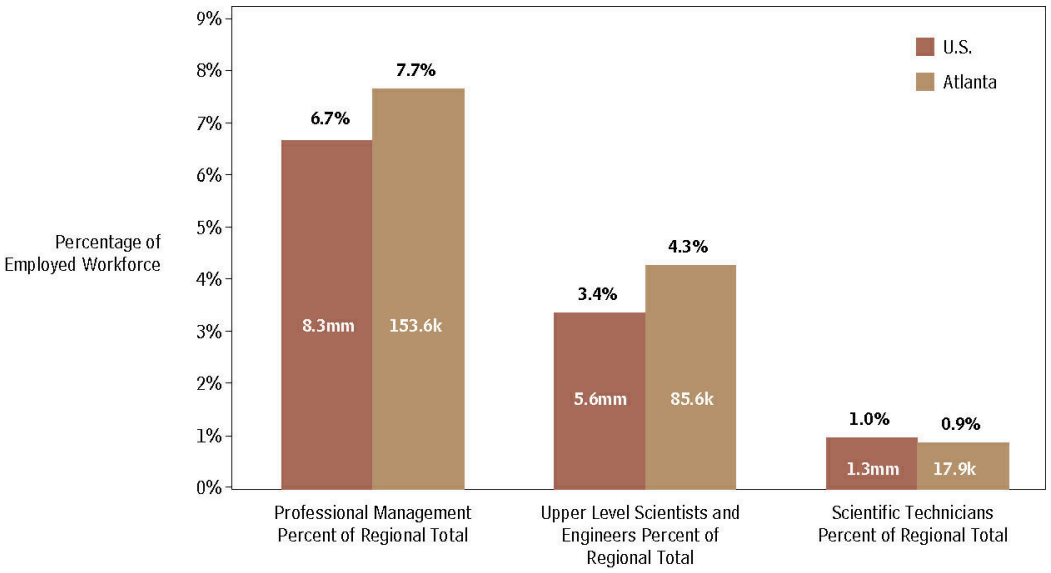
GRTA has been successful in getting the EPA to approve a transportation plan, freeing up federal highway funds. In addition, it has signed a contract with MARTA to extend bus service to Clayton County and has promoted the start-up of electric bus shuttle services in parts of Metro Atlanta.

However, the agency is still facing difficulties in managing local and regional government priorities for transportation initiatives, and has taken much longer than expected to set criteria to judge long term transportation plans for the metro area. The Authority has suffered a number of setbacks due to key directors leaving to take other positions. Still, it is clear to most observers that this model offers a better chance of addressing the air quality and transportation challenges than the highly fragmented governance model that allowed them to develop in the first place.

Source: Atlanta Journal Constitution, GRTA website, Project Interviews

Skilled Workforce. Exhibit 48 shows that there are relatively large numbers of scientists, engineers, and managers in Atlanta. Atlanta has a technical labor pool significantly more rich than most regions in the United States. The region has a greater concentration of business managers (7.7%) and top-level scientists and engineers (4.3%) than average. However, competitor regions like Austin have a higher percentage of highly skilled labor (9.6% professional managers and 6.4% engineers). Still, surveys and interviews indicate that many firms came to Atlanta because of its deep and talented labor pool.

Exhibit 48: Skilled Workforce Base in Atlanta and the United States, 1998



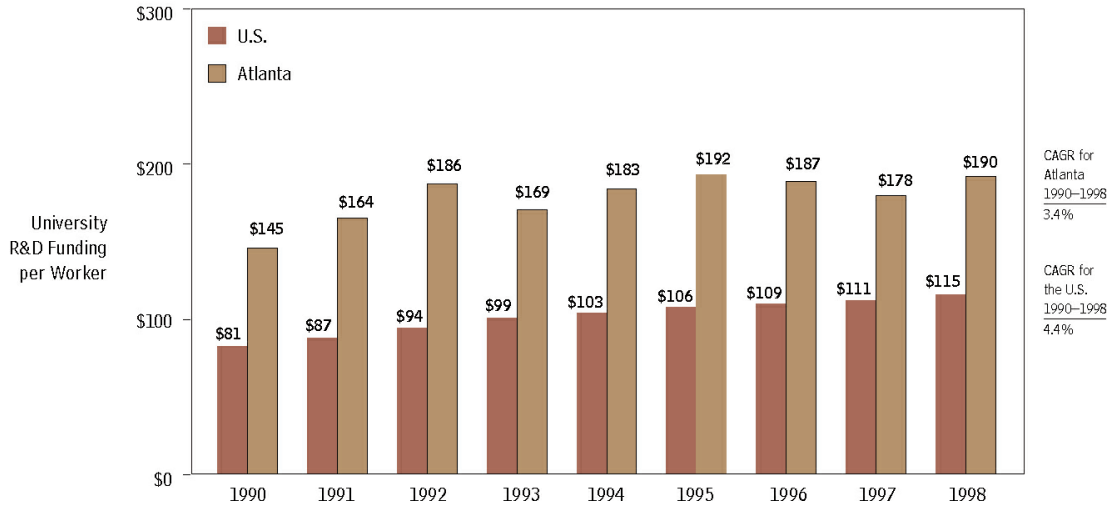
Note: Professional Management includes Staff and Admin Specialty Managers, Line and Middle Management Managers, Other Managerial and Administrative Positions Scientists and Engineers includes: Engineers and Related Occupations, Natural Scientists and Related Occupations, Computer, Mathematical, Operations Research, and Related Occupations, Economists. Technicians includes: Technicians and Technologists in Scientific and Engineering Related Occupations
Source: U.S. Bureau of Statistics, Occupational Employee Statistics

In 1997, Atlanta regional universities produced 9,150 advanced and bachelors degree holders in the hard science and engineering fields. This number reflects a significant jump from the 6,750 science and engineering graduates in 1990 and equated to 2.4% of the total U.S. graduates; much higher than Atlanta's 1.8% of U.S. employment.[43] In the 2002 U.S. News and World Report rankings, Georgia Tech's engineering graduate school places fifth in the nation.[44] The undergraduate program ranks sixth.

Impressively, Atlanta is able to retain many of the students its colleges educate. Over the past ten years, 40% of the graduates of Georgia Tech and Emory – universities that draw from a national pool of applicants - have chosen to remain in the metro area.[45] Despite the region's growth in highly trained graduates and its relatively rich pool of highly skilled workers, however, regional business people are still concerned about finding enough skilled workers. Only 34% of the leaders surveyed felt that the available pool of skilled workers was sufficient to support the region's future growth, lower than the average of 37% across all regions.[46]

Investment in Research and Development. Atlanta leaders have been successful in attracting research dollars to the metro area. From 1990 to 1998, Atlanta-based universities increased their annual amount of federally funded R&D from $241 to $409 million.[47] In 1998, this investment represented more than 2.7% of total federal university R&D. Although Atlanta's share grew faster than the total amount of federally funded research in absolute terms, the region registered slower-than-average gain in research funding per worker. (See Exhibit 49).

Exhibit 49: Federal Funding for University R&D per Worker, Atlanta vs. U.S., 1990 to 1998



Source: NSF WebCASPAR Database System, U.S. Bureau of Labor Statistics

Seventy-three percent of those surveyed reported that local research centers were readily available in the region, and 49% said that these centers frequently transferred knowledge to the private sector.[48] Both of these percentages were significantly below levels reported in San Diego and the Research Triangle. A number of Atlantan business leaders we surveyed expressed concern that the university technology transfer offices were not highly proactive in assisting businesses.

Outside evaluators have a slightly more positive view of the technology transfer programs at Atlanta institutions. In a 2000 Southern Growth Policies Board study of 72 southern and southwestern research universities, both the University of Georgia and Georgia Tech ranked in the top tier. The University of Georgia was one of four "best in class" universities while Georgia Tech was one of three ranked just below this level. Emory University was also highly ranked.[49]

In 1999, Technology Review magazine ranked Emory 14th of 132 major U.S. universities in terms of technological strength.[50] Georgia Tech ranked 18th on the same list. Based on these rankings, Atlanta joined Boston, the San Francisco Bay Area, Pittsburgh, Philadelphia, and Raleigh-Durham as the only regions with two universities in the top 20.[51]

Quality of Education. The quality of K-12 education in Atlanta is highly variable. Most wealthy residents live in the few neighborhoods that support uniformly good primary schools, or they send their children to private schools. Lower income residents face a public school system that does not meet national achievement averages. The average teacher-student ratio (16.3:1) in the metro Atlanta region is actually slightly better than the national average (16.8:1), but that has not translated into improved results. Between 1995 and 1999, the Atlanta regional high school graduation rate of 72% trailed the national averages of 83%.[52] The growth of the state and region has also created a serious teacher shortage in many fields. More than 10,200 teachers were hired in Georgia in 2000, while Georgia colleges only graduated 4,100 teachers.

Business and community leaders we surveyed were very concerned about the status of primary and secondary school education in the region. Only 20% believed that overall quality of the K-12 education system was high while 60% ranked it low. Fifty-three percent of the private sector respondents felt that the education system would be a threat to future expansion in the region were it not addressed.[53]

Efforts at the state and regional levels are underway to improve the quality of education. To address the teacher shortage, the State of Georgia is experimenting with a program called Teach for Georgia that invites working professionals to take a four-week training course in teaching. Graduates are paired with mentors and placed in schools facing shortages. To focus on improving student achievement, the state passed HB 1187 in 2000, which set maximum levels for student-teacher ratios and provided more than $500 million in new funding for classroom construction and teacher aides. The requirements have forced school systems in fast-growing Metro Atlanta counties to propose tax increases for the first time in five years.[54]

Supply of Risk Capital. Local risk capital is much more plentiful in Atlanta today than it was ten years ago. Many of the entrepreneurs interviewed stated that over the last decade, it had become much easier to finance firms through local angel and VC firms. According to one technology entrepreneur, "today there are seven VC firms of significant size and a number of smaller firms. Angel networks are in place and growing. Technology start-ups have a much easier time in securing local financing than five years ago."[55]

Atlanta survey respondents report that regional access to risk capital is sufficient to meet their funding needs. Most entrepreneurs we interviewed said that local VCs were accessible and helpful, although some stated that they still needed to search outside the region for initial funding and that the pace of VC deals in Atlanta was not as fast as that in Silicon Valley.

The Role of Government

Government actions - by federal, state, or local agencies - affect innovation through their influence on elements of the diamond. As discussed previously, the state government in Georgia has taken a particularly active role in supporting business and economic development projects in Atlanta.

The federal government has played a significant role in building the infrastructure for manufacturing in the region and state. First, during World War II, the military made massive investments in the state, establishing 20 military installations (11 still operate). Richard Combs and William Todd, two regional leaders, argue that these bases created "new ranks of skilled manufacturing workers" to feed the manufacturing boom in the 1960s through 80s.[56] The federal government also supports innovation in the region through Department of Defense, National Science Foundation, and National Institutes of Health research grants to regional universities.

State support for knowledge-based economic development projects extends back into the 1880s, when agricultural extension programs were set up throughout the state by the University of Georgia. Since the 1960s, knowledge-based economic development has been a policy initiative of every governor. In the 1980s and 90s it has become a policy priority of every governor. In most cases, the initiatives have been designed by, or developed in response to, private sector leaders and implemented through the Georgia universities and colleges. Innovative programs include:

Advanced Technology Development Center (1980): ATDC is a business incubator on the campus of Georgia Tech aimed at fostering growth of high technology businesses and collaboration between high tech firms. Today, there are multiple sites throughout the state.

Centers of Excellence (1985–90): There are state-funded research centers at three campuses, University of Georgia (Advanced Computational Methods Center, Life Sciences Center), Georgia Tech (Micro-Electronics Center, Manufacturing Research Center, Institute of Paper Science and Technology), and Emory (Rollins Research Center).

Georgia Research Alliance (1990): The Georgia Research Alliance is an alliance of six Georgia research universities aimed at attracting top international scholars in targeted areas of technology. Through 2000, more than $276 million had been invested in the program. (See text box for more information.)

Hope Scholarships (1993): The State of Georgia passed a Lottery Bill that dedicated all revenues to higher education. One of the programs funded, the Hope Scholarship Program, guarantees full tuition payments at state universities for all Georgia resident students who had at least a B average in high school and maintain a B average in college.

Intellectual Capital Partnership Program (1996): The ICAPP program is a state-funded partnership with universities, businesses, and regional workforce institutions to provide customized workforce training as part of business attraction and retention efforts in the state. Georgia residents receive tuition assistance for the training held at state educational institutions, while the targeted businesses are able to find trained workers at a reduced cost.

Yamacraw Mission (1998): Based on the Georgia Research Alliance Model, this state-sponsored initiative seeks to stimulate the development of 2,000 jobs and upwards of 10 new companies in Georgia that focus on one of three areas: optical networks, digital signaling, and broadband communications. A major component of the initiative is the development of academic programs at eight universities in Georgia to develop a highly trained workforce.

In addition to these initiatives, Governor Barnes' administration has been actively pushing all state government departments to upgrade their e-commerce platforms and web-based service offerings to Georgia residents.[57]

Georgia Research Alliance. The Georgia Research Alliance (GRA) is an alliance of six Georgia research universities: Emory, Georgia State, Georgia Institute of Technology, University of Georgia, Clark Atlanta Colleges and Medical College of Georgia. The Alliance cuts across traditional boundaries in academia and business. Its members include both public and private universities, and the board includes the presidents of the six universities and 12 business leaders from the state.

The GRA is organized as a non-profit institution that receives public and private funding. Each year the GRA submits a recommended expenditure on scholars, programs, and infrastructure to the state, but begins each year with no assured allocation of funds. Private sector donors can specify the use of their funds by endowing chairs at one of the six universities and by assisting the GRA in helping to locate professors to fill the chair. Lucent Technologies, for example, has funded the Lucent Chair at the Center for Wireless Technologies at Georgia Tech.

GRA History. GRA's roots can be traced back to Atlanta's loss of the competition to win the Microelectronics and Computer Consortium (MCC) in 1984. Its loss was a "wake-up call" for the state. Responding to the suggestion of two very successful Atlanta real estate developers, Tom Cousins and Larry Gellerstedt, Governor Joe Frank Harris organized a committee of state business leaders to help him develop a strategy for Georgia. In 1986, McKinsey & Company completed a benchmarking report that argued that the common denominator of successful regions was having a strong research university and superstar researchers.

In the wake of the study, Governor Harris launched a "centers of excellence" program that funded a number of research centers at state universities. Though one of the study recommendations was to develop a unified agency to streamline and enhance research efforts to focus on economic development, Governor Harris and the university presidents, who were used to autonomy, were cool to the idea.

In 1989, with Harris on the way out and new leadership in place at the large universities, Cousins and Gellerstedt approached the two gubernatorial candidates to seek their support for the GRA concept. Both candidates agreed to support the idea. Newly elected Governor Zell Miller held to his word, and the Georgia Research Alliance was born in June 1990.[58]

GRA Role. GRA has two major complementary programs centered on the promotion and funding of research. The Eminent Scholars program seeks to find and attract leading researchers from throughout the world to Georgia research universities. In addition to finding "star quality " researchers active in fields identified as priorities by the state (advanced telecommunications, biotechnology, and environmental technology) the search committee looks for professors who have successfully formed strong research teams and who appreciate the importance of commercializing research. Eminent scholars hold university posts and are paid by the university like any other professor. However, they can get up to $5 million for equipment.

The Research Infrastructure Program invests heavily in research equipment, tools, and lab space to support the work of university researchers as well as the work of business incubators and commercialization programs. The funding is part of the carrot that the state uses to attract eminent scholars to Georgia schools.

According to Mike Cassidy, president of the GRA, one of the key focuses of the GRA is to spur collaboration across the universities. " The GRA is a "real facilitator of interdisciplinary interaction. We look across existing centers at the universities and help them coordinate work."[59]

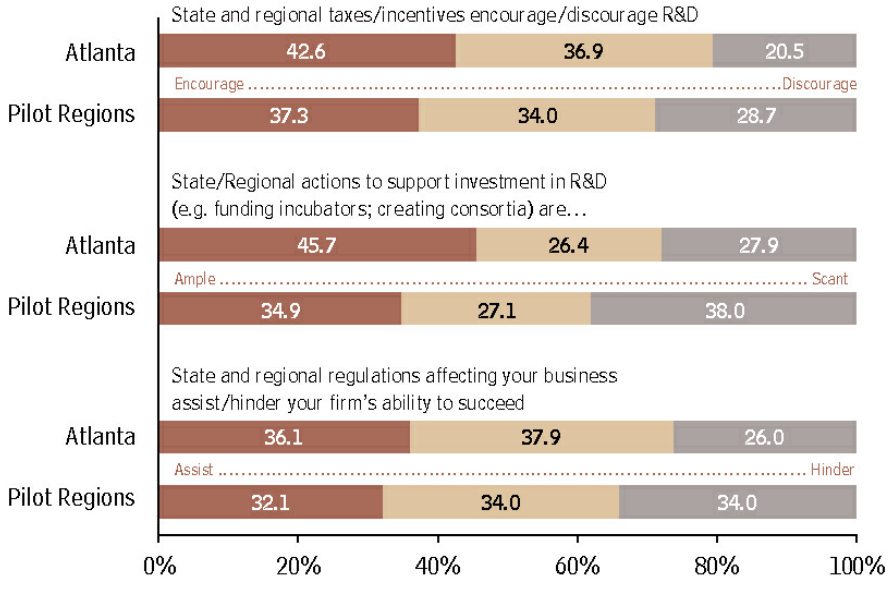
GRA Results. According to Cassidy, at least 50 companies have formed or been enticed to come to Georgia as a result of GRA programs. So far 32 eminent scholars have been recruited to the state. Two major research facilities, the Georgia Center of Advanced Telecommunications Technology (at Georgia Tech) and the Center for Applied Genetics Testing (at the University of Georgia), have been developed.

Cassidy believes that state legislators and university officials have become much more supportive of business-academic ties. GRA has been helpful in creating the conditions where researchers can be chief scientific officer of a company while maintaining their academic posts.

The Alliance has also helped the universities become more successful at attracting federally sponsored research. In 1990, the universities had approximately $400 million in federally sponsored research. In 2000, the universities in the consortia received approximately $800 million.[60]

Many business leaders credit local and regional governments in Atlanta because they typically have a pro-business attitude. Permitting offices work hard to provide fast service and in the words of one developer, have a "let's make it work attitude." Business leaders we interviewed, with few exceptions, believe that the city government in Atlanta is pro-business and pro-development. Historically, this stance has assisted the region in accomplishing major economic development initiatives like the attraction of sports teams, the development of Hartsfield Airport, and business attraction efforts. As Exhibit 50 shows, compared to other regions in the study, the Atlanta leaders were more positive about the regional and state government impacts on business innovation and success.

Exhibit 50: State and Regional Government Impacts on Business Success, Atlanta vs. Pilot Regions



Source: Clusters of Innovation Initiative Regional Survey™, N=169 Atlanta; N=633 Total

However, this "laissez-faire" attitude has also contributed to the environmental and capacity problems that have hindered additional growth. As one strong critic, Lawrence Frank, Georgia Tech Professor of City Planning, put it,"The threat to parks is one of the unthought-out, less measured impacts of rapid, unplanned growth, more often discussed in terms of choking traffic, unsightly strip malls, cookie cutter subdivisions, and air like ozone soup."[61]

Metro Atlanta is a conglomeration of scores of government entities – counties, cities, and school districts — each with its own governing body.[62] Atlanta's governing institutions presently face the need to integrate their efforts to address regional problems. However, there is little precedent for working together to solve cross-regional issues.

Regional Institutions for Collaboration

Institutions for collaboration facilitate the flow of information and resources within and among clusters (e.g., university technology transfer offices connect commercializable research with entrepreneurs). Proximity naturally creates opportunities for interaction, and institutions for collaboration can bolster these interactions. Although some regional level collaborative institutions in Atlanta have been important and highly successful in the past, it is questionable whether the current set of formal and informal institutions will be sufficient in the future.

For more than a hundred years, the Metro Atlanta Chamber of Commerce has been the primary linking institution in the Atlanta business community. It has played an active role in implementing most of the major economic and social initiatives, including Forward Atlanta, the Olympics bid, and presently, the Industries of the Mind Initiative, a technology-based economic development effort. The organization presently has more than 8,000 members, making it the largest chamber in the South.

The Chamber plays an active role in grouping business interests to focus on key challenges to regional prosperity, including education and traffic congestion, through forming special initiatives. Presently, they are supporting efforts like Atlanta Partners for Education, Southeastern High Speed Rail Corridor, and the Atlanta Sports Council.

The Chamber generally receives praise for its efforts from community leaders. One real estate executive said, "the Atlanta Chamber is as good as it gets. The Chamber does a great job at explaining to potential transplant businesses that Atlanta would be a great place to locate."[63] A corporate lawyer praises the Chamber's ability to convene leaders, "The Metro Chamber has played an important role here. This group can bring together corporate and community leaders. In Washington, D.C., the Chamber didn't matter."[64]

The Chamber is presently facing a challenge similar to that of other Atlanta-based regional institutions. Historically the Chamber has been led by business people from and focused on the City of Atlanta. As the region expands and the predominance of the City of Atlanta decreases, the Chamber faces the need to incorporate leaders from throughout the region. Despite the recent name change to the "Metro" Atlanta Chamber, the organization still has not fully expanded to include leaders from all suburban counties.

The Atlanta region also benefits from a number of other formal institutions of collaboration that serve a variety of economic development purposes. These include:

- Central Atlanta Progress (CAP) is a 60-year-old downtown revitalization organization that focuses on developing commercial and residential properties in Central Atlanta. In addition, CAP works with the city to organize public services like transportation and sanitation for downtown users and plan use of downtown public spaces.
- Atlanta Regional Commission (ARC) includes representatives from the communities and major governmental bodies in the Atlanta region. It facilitates regional cooperation on projects that cross government jurisdictions and generates economic information that is used by businesses and government to develop growth strategies.
- Research Atlanta is a Georgia State University office that performs much of the community research that is required by economic development professionals and urban planners. It also convenes conferences on major issues facing the region.

Atlanta is also home to a number of informal networks that spur collaboration. Many interviewees commented upon highly active university alumni associations that exist in Atlanta. The area is home to the nation's largest alumni association chapters for the University of Georgia, Georgia Tech, the University of Virginia, Duke, the University of North Carolina, and Vanderbilt. These organizations often sponsor social events like golf tournaments, speaker series, and basketball-watching events. While business is typically not the purpose of the events, often contacts are made that lead to commercial opportunities.

Of special note is the large number of Georgia Tech grads in the region who continue to leverage access to university-based events, young graduates, and information. A number of Georgia Tech grads commented that the rigors of the university created a common bond. One Atlanta entrepreneur and 1961 Tech grad explained, "Georgia Tech alums are an incredible network. You 'get out' of Georgia Tech, you don't graduate. This creates a strong sense of camaraderie that helps develop a strong informal network here."[65]

Beyond particularly strong university alumni associations, Atlanta also distinguishes itself from other communities by the unusually high civic participation of its university presidents. Spurred in part by the economic development mission of the Georgia Research Alliance, local university presidents play active and collaborative roles in community organizations like the Chamber, the Atlanta Regional Consortium for Higher Education, and Central Atlanta Progress. The presidents and their boards of regents have come to understand that universities are critical players in the innovation progress of the region and have recently placed increasing focus on improving ties with the local business community.

For a more comprehensive listing of collaborative institutions in Atlanta, see Exhibit 51.

Institutions for collaboration have been important factors encouraging the development of Atlanta's economy. Various Chamber leaders, including Sam Williams, the present Chamber president, have helped mobilize the city leaders to pursue major economic development initiatives. The Georgia Research Alliance, promoted by Governors Miller and Barnes, has catalyzed more and higher quality knowledge-based research and commercialization. ICAPP has promoted workforce development partnerships throughout the state. (See box below) The Technology Association of Georgia (TAG) and its member organizations have helped foster cross-firm and cross-industry collaboration.

Exhibit 51: Major Institutions for Collaboration in Atlanta

Case Study of ICAPP: Columbus State University/TSYS Partnership[66]

In 1996, Total Systems Services, Inc. (TSYS), one of the world's largest credit and debit card processing companies, projected that it would need up to 500 new computer and business analysts per year to keep up with its anticipated growth. At that time, the entire University of Georgia system was graduating fewer than 800 people with such backgrounds each year. As a result, TSYS, based in Columbus, began to search for alternative locations capable of meeting its needs for a skilled, educated workforce.

In response to the possibility of losing key high-tech employers like TSYS, Governor Zell Miller announced the creation of ICAPP in March 1996 with an expedited education program at Columbus State University, designed to help TSYS fill its workforce needs, as its first significant initiative. This commitment of state resources influenced TSYS to end its search for alternative locations and to announce its intention to expand its operations in Columbus with a capital investment of $100 million and a plan to increase its workforce to 5,000 (from 3,200 in 1997). The Wall Street Journal identified the TSYS decision as the most significant investment in the southeastern U.S. for 1996.

Columbus State's first ICAPP class (consisting of 80 students) graduated in March 1997 after an intensive six-month educational program that included extensive direct experience with the same hardware and software used by Total Systems. All graduates were offered positions at TSYS. By the end of 1998, more than 500 individuals had completed this ICAPP education program.

A number of other Columbus-based companies, such as AFLAC, are now taking advantage of this work force development and expansion incentive. The AFLAC project is focused on providing expedited computer education in Java, HTML, Windows NT, and distributed computing systems. AFLAC needs job candidates with such skills in order to fulfill its plans to increase the size of its Information Technology Division in Columbus by more than 200 people.

Despite the importance and past contributions of collaborative institutions in Atlanta, it is questionable whether the region has the right types of collaborative institutions for the future.

There is a real question of geographic reach. Even the Metro Atlanta Chamber, the largest organization, has trouble incorporating its full potential membership. It faces competition from other local and county-wide chambers in the region. With the exception of information technology (TAG), cluster-level organizations are typically less developed and include fewer members from outside the city center and close suburbs. All of the clusters we studied had mixed views on the quality of assistance offered by their regional cluster-specific institutions of collaboration.

Attitudes toward Business

Since its inception, Atlanta has been known as a pro-business town. Zoning and environmental regulations have historically been quite permissive. Its leaders, both civic and commercial, have generally supported pro-development rules toward real estate and industrial expansion. There has been a shared vision on commercial development because historically, civic and commercial leaders have been one and the same.

There have been some important changes over time, however. Until the 1970s, most of the political leaders were white, originally from the region or at least the state, and involved in business pursuits. Black business owners and political leaders did exist, but primarily in a separate but linked economy. In the 1960s, in the turmoil over civil rights, white and black leaders chose business success over racial hatred. There were many white people in Atlanta who were not "too proud to hate." However, the white leadership, led by Mayor Ivan Allen, saw the importance of racial integration to the future business success of the region.

Today, despite the remnants of racism, business and political leaders are racially diverse. Atlanta has a large and prosperous Asian population, and there has not been a white mayor since Maynard Jackson became the first black mayor of a major Southern city in 1973.

In the business and civic organizations, being from Atlanta is no longer a key factor for assuming a leadership position. Interviewees, both native Atlantans and transplants, share a common view that Atlanta is a community that values participation and productivity more than heritage or wealth.

One newcomer to Atlanta said, "You can be from anywhere and do fine—it's very easy to become networked. The other end of the spectrum would be places like Dallas and Richmond, Virginia, where being from the region is very important."[67] Another transplant, a native New Yorker, expressed surprise at the ease in which he was accepted into the Atlanta business community, "I thought it may be difficult to integrate here, but it was not at all. There is a growing entrepreneurial culture and still a lot of old world influence here."[68]

Part of that old world influence is the civic pride and boosterism that are particularly strong in Atlanta. The positive side of this trait is that leaders often make a point of going out of their way to help entrepreneurs in the region. Deslie Webb, an Internet entrepreneur originally from Florida, said she was very impressed with the willingness of law, accounting, and VC firms to assist her. Webb believes there seems to be a true desire to foster entrepreneurs and feels a great deal of camaraderie with other firms in the ATDC. "Every one is rooting for everybody else."[69]

Civic pride in Atlanta has translated into a sense of confidence that Atlanta can achieve what ever it wants: the state capital, a baseball team, the Olympics. As one communications executive commented regarding the traffic problems, "We always find a way to work out big issues. We'll figure transportation out, too." [70]

However, the way that Atlanta has won its battles has traditionally been through major one-time initiatives, big projects that address concrete issues. As Rick Reinhard of Central Atlanta Progress argues, "Atlanta is a silver bullet type of town. It does not rely on rely on process or ongoing task forces, but efforts by great individual leaders that drive change."[71]

CONCLUSION

The Atlanta region is a success story thanks in large part to the development of a solid competitive environment that extends, as we shall see below, to a variety of different sectors. Business leaders today believe that Atlanta is a good location for their business. Eight-five percent of Atlanta survey respondents felt that the region offered a good or very good environment to support innovation. Atlanta business people were the most positive of all our survey regions.[72]

However, the region is faced with serious issues that threaten its business environment and quality of life. And unfortunately, the Atlanta region is not well configured to solve these problems. Neither the Atlanta regional culture nor its institutions presently support the complex, interrelated efforts necessary to combat its educational, environmental, and transit issues. Civic pride and great individual leaders can help address these challenges, but they cannot fully replace the need for process-oriented institutions that can convene regional leaders, government funders, and policy innovators to solve complex problems. The problems the Atlanta region faces cannot be solved with silver bullets.

4 COMPETITIVENESS OF SELECTED CLUSTERS

This report looks at competitiveness with an emphasis on innovation. We have shown how regional economic performance and innovation output derive from the composition of the economy, and how the composition, in turn, depends upon the regional business environment. To assess the regional business environment, we used the diamond framework. This same methodological approach guides our analysis of individual clusters in Atlanta.

Many factors that foster innovation are best understood by analyzing business clusters. Economic performance and innovative capacity vary among clusters, even within a region. Some elements of the diamond are more relevant for analyzing economies at the regional level. Other elements are more cluster-specific. Sophistication of demand, context for firm rivalry, and related and supporting industries are more relevant for understanding clusters than entire regions. Factor inputs are important at the regional level, but our focus will be on ***specialized*** inputs (e.g., the presence of logistics research centers) particularly useful for a cluster, rather than general inputs (e.g., quality of K-12 education). We also examine government policy and cluster-specific institutions for collaboration.

To better understand how these factors lead to innovation, we analyze the financial services, transportation and logistics, and information technology clusters in Atlanta. The financial services cluster has been a traditional strength of the region, but recently has undergone a transformation in its composition and also its regional scope. The transportation and logistics cluster, the first economic pillar of Atlanta, has also undergone significant change and continued growth. The information technology cluster is a relative newcomer to the region but took off in the late 1990s. These three clusters are all good performers and hence offer lessons for other clusters and regions. They are not representative of all clusters in Atlanta.

THE FINANCIAL SERVICES CLUSTER

Nationally, the financial services cluster is composed of a variety of industries that provide banking, insurance, and securities services. The cluster also includes information services, real estate, and technology providers. The metropolitan area with the highest share of national cluster employment is New York with 8.3% of cluster employment. Boston, Chicago, and Los Angeles are the next largest regions, though none competes with New York for its leading status in terms of both numbers of jobs and headquartered firms. Over the past decade, the nation has seen an increasing distribution of financial service firms. The share of total national employment in the top five largest regional clusters has dropped from 27.1% to 24.7%.

The financial services cluster in Atlanta is widely diversified, with broad representation of almost all of the subclusters in the national cluster. Cluster firms have grown rapidly both in terms of employment and wages over the decade. The cluster has particular strength in real-estate investment and benefits from hosting the Regional Federal Reserve Bank for the Southeast. Atlanta, once a home to many bank headquarters, has lost many of those to Charlotte, North Carolina and other regions. However, most of these banks maintain large regional offices in Atlanta, and numerous new banks, securities and brokerage firms, and financial planning companies have established or expanded offices as the region's economic base has grown. In addition, regional financial service providers have been leaders in developing and adopting electronic commerce applications for the sector.

Our assessment of the regional innovative capacity shows that the large regional client base, very strong cluster rivalry, the regional technology infrastructure, and access to leading information technology services have been important in spurring the financial service cluster's growth.

Development of Atlanta's Financial Services Cluster

Atlanta's financial service cluster has grown with the region's growth as a commercial center and major population center. Beginning as a major train transport hub for southeastern regional products, the region attracted financial services like banks and insurance companies to support its commerce.

The banking sector grew organically with the community—as Atlanta continued to grow throughout the 20th century, so too, did its banks. By the 1970s, Atlanta was home to the most important commercial banks in the Southeast, led by First Atlanta and Georgia Trust. Southeastern real estate development also became centered in Atlanta as the metro area expanded. Atlanta developers like Tom Cousins helped broaden and heighten the commercial landscape of the Atlanta area and also develop other southeastern cities.

In the 1980s, the fortunes of the two sectors diverged. Real estate took off as more developers established themselves in the region, and financing, both by banks and eager savings and loans, was easy to obtain. Atlanta regional governments typically placed few restrictions on commercial development, further facilitating the process.

While the local banks also profited from the real estate boom, they became targets for merger or relocation. Banks and economic development officials in neighboring states like North Carolina and Alabama were presented with an opportunity created by their favorable intra-state branch banking regulations and Georgia's very restrictive regulations. Starting in 1984, banks based in North Carolina took the lead in merging and acquiring Atlanta-based banks. The first bank to make the move was Wachovia Corp, which acquired First Atlanta. This deal became a catalyst for further mergers and moves that left Atlanta without any major bank headquarters in the early 1990s. Today, three of the top four banks in Georgia are headquartered in North Carolina, while two of the next largest are based in Alabama. SunTrust is the one local bank included in the top six.

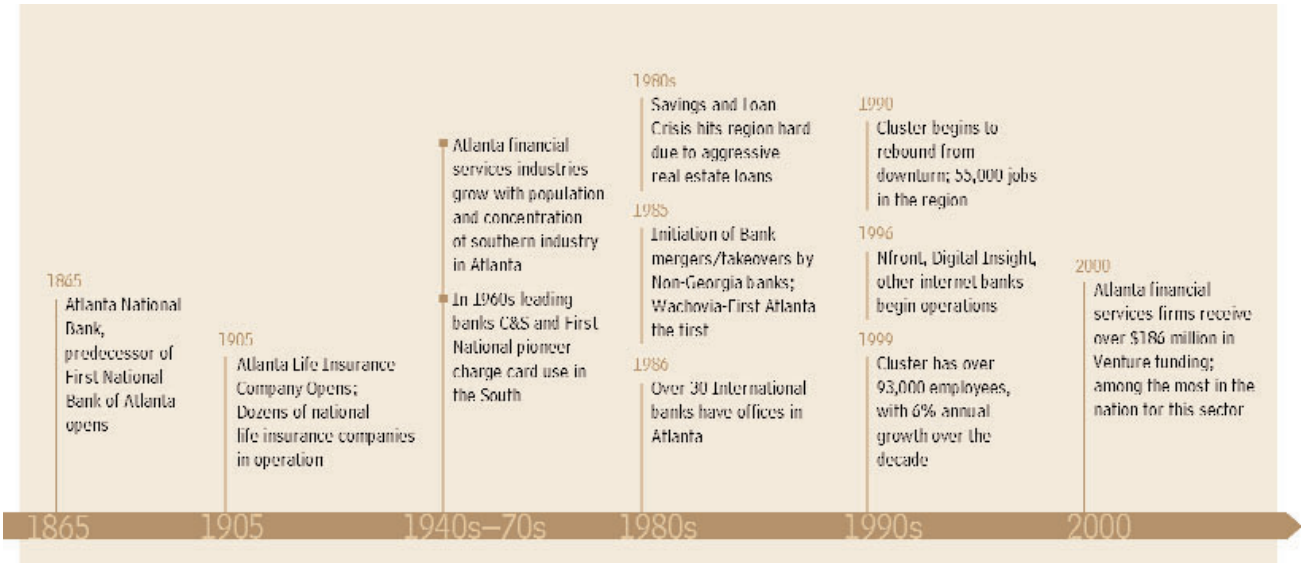
Despite the impact of losing bank headquarters, the commercial power and quality of life of Atlanta have induced many banks to maintain very large offices in the region. Among the largest, both NationsBank and First Union, have more employees in Atlanta than in their Charlotte headquarters.

In the 1990s, the financial services sector has continued to grow and diversify. Using the broad cluster measure, the cluster saw impressive growth in terms of employment, adding nearly 40,000 jobs from 1990 to 1999 and wages, averaging 7.4% annual growth over the decade. Also, other financial service providers

like securities and brokerage firms, financial planning companies, and leasing agents have established or expanded offices as the region's economic base has grown. Further, the 1990s have seen a large expansion of venture capital firms and angel networks to support entrepreneurial interests in the region. One area needing additional development is the presence of investment banks, but many New York based operations were considering establishing offices in Atlanta prior to September 11th. Ironically, the disaster in New York may speed up their efforts.

The recent economic downturn poses a significant threat to Atlanta's banks—as it does to the entire national financial system. However, the regional financial services platform is strong and broad enough to withstand an economic downturn and still support local needs.

Exhibit 52: Atlanta Financial Services Historical Timeline



Source: Corporate Information, Interviews, "Celebrating One Hundred Fifty Years of Atlanta Business", Atlanta Business Chronicle 1987, PriceWaterhouse Coopers

Recent Economic Performance

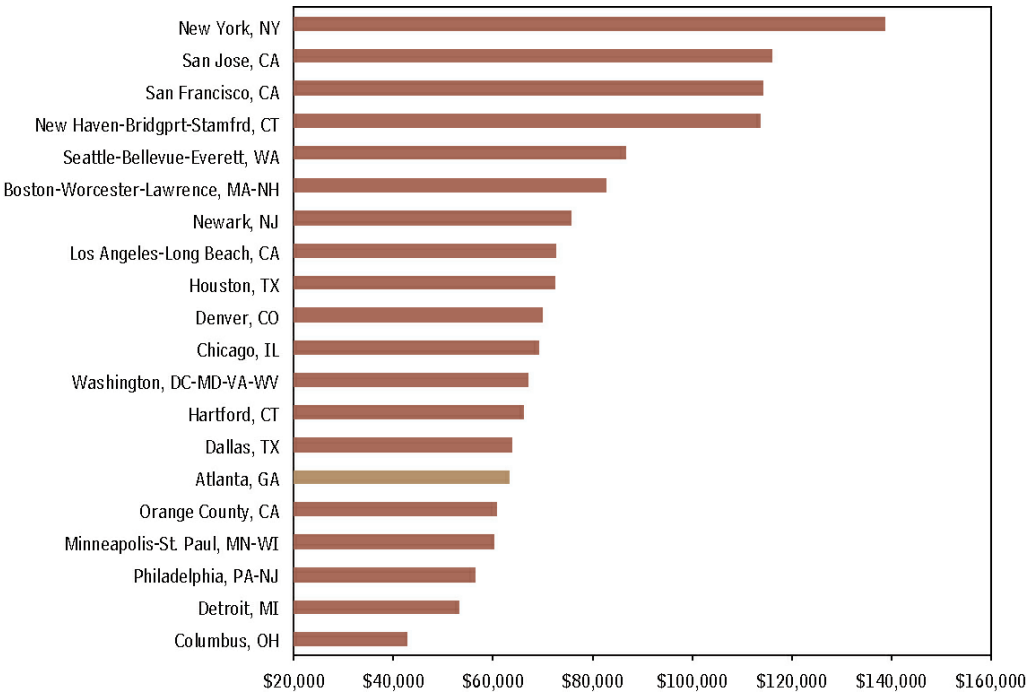
Employment. In 1999, the Atlanta MSA had more than 93,500 financial services employees, making it the nation's eighth largest MSA with 2.1% of the nation's financial services employment.[73] As measured by location quotient, the Atlanta cluster was among the least concentrated of the 20 largest clusters in the United States.[74] From 1990 to 1999, Atlanta's financial services cluster had an annual growth rate of 6.0%, second only to San Jose/Silicon Valley among the 20 largest U.S. MSAs (see Exhibit 53).

Exhibit 53: Top 20 MSAs for Financial Services Employment, 1999

Metropolitan Area	1999 Total Employment	Average Annual Employment Growth, 1990–1999 (%)	1999 Employment Location Quotient	1999 Share of National Cluster Employment
New York, NY	368,654	0.9	2.5	8.3
Boston-Worcester-Lawrence, MA-NH	219,558	5.9	1.9	5.0
Chicago, IL	216,434	2.2	1.4	4.9
Los Angeles-Long Beach, CA	145,625	1.8	1.0	3.3
Washington, DC-MD-VA-WV	143,603	5.3	1.7	3.2
Philadelphia, PA-NJ	135,933	3.6	1.6	3.1
Minneapolis-St. Paul, MN-WI	98,083	5.9	1.5	2.2
Atlanta, GA	93,553	6.0	1.2	2.1
San Francisco, CA	89,889	5.9	2.3	2.0
Dallas, TX	86,978	5.2	1.2	2.0
Detroit, MI	70,748	4.0	0.9	1.6
Hartford, CT	63,967	1.4	2.9	1.4
Houston, TX	62,301	4.2	0.9	1.4
Orange County, CA	61,883	3.6	1.2	1.4
Seattle-Bellevue-Everett, WA	57,392	4.5	1.2	1.3
Newark, NJ	56,501	-0.1	1.6	1.3
San Jose, CA	55,356	13.6	1.5	1.2
Columbus, OH	55,213	4.9	1.8	1.2
Denver, CO	51,881	5.0	1.3	1.2
New Haven-Bridgprt-Stamfrd, CT	51,406	5.4	1.6	1.2

Note: Broad cluster definition
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Exhibit 54: 1999 Average Wages in 20 Largest Financial Services MSAs



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Wages. Average wages paid in the Atlanta cluster rank 15th among the largest 20 clusters, and have been increasing at over 7% a year in the 1990s. This growth has helped Atlanta financial service workers gain on their counterparts in most other regions, though the average wage of $63,300 is significantly below leaders like New York and San Francisco, where average salaries top $110,000 (see Exhibit 54).

Patents. Financial services is a relatively low patenting cluster nationally (approximately 180 total patents in 1998), which makes comparisons difficult. Based on available data, Atlanta has been growing faster than all but three of the largest 20 regions.

THE NARROW CLUSTER VIEW

The narrow financial services cluster is composed of the banking, securities services, insurance products, real estate investment, leasing, and tangible asset investment subclusters. The employment in the narrow cluster is 59,250 compared to 93,550 in the broad cluster. Computer and communications services, a shared subcluster, supports more than 19,000 jobs in the region and makes up the largest difference between the two measurements.

The main difference the two views illuminate is in the growth of employment in the cluster. The narrow cluster enjoyed only 4.1% annual growth over the decade while the broad cluster grew at 6.0% annually. Still, this rate was enough to place Atlanta as the seventh largest narrow cluster in the country.

Wage levels and wage growth show little difference in the two views.

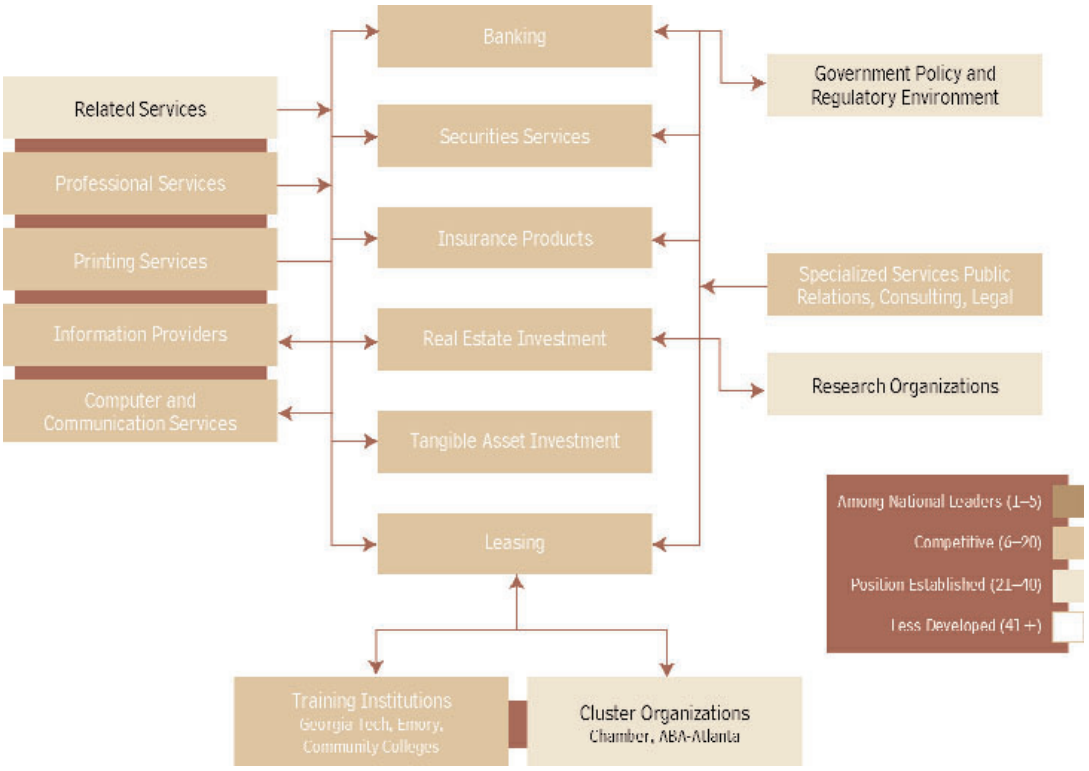
Establishments. We use establishment growth as a proxy for new firm formation. Atlanta, with more than 2,600 financial services establishments in 1999 ranked seventh in the country in this measure. Annual growth averaged 6.2 % over the decade. This rate of establishment growth was the fastest among the 20 largest clusters in the United States, though major areas like New York and Boston actually added more establishments overall.

Venture Capital Funding and IPOs. According to PriceWaterhouseCooper's Money Tree, Atlanta's financial service firms received $235 million in VC funding from 1995 through third quarter 2000. For the period as a whole, this represented 5.1% of the national total, well above Atlanta's 2.1% of national cluster employment. 2000 was by far the most successful year as Atlanta firms attracted more than $186 million in venture capital or nearly 10% of the total national VC investment in financial service firms. Many of the firms that received funding were focused on financial transaction services like electronic payments (Lynk Systems) and Internet commerce support services (CyberCapital).

Competitive Position of Atlanta's Financial Services Cluster

Exhibit 55 depicts the Atlanta financial services cluster. The boxes to the right (specialized services and government policy and regulations) and below (training institutions and cluster organizations) are important components of the cluster, and their relative strength has been assessed using interview and survey data. The other boxes are the industry-based subclusters present in the region; the Cluster Mapping

Exhibit 55: Atlanta Financial Services Cluster



Source: Clusters of Innovation Initiative Regional Survey™ Data, Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School and In-person interviews

Exhibit 56: Competitive Position of Industries in Atlanta's Financial Services Cluster, 1999

Subcluster	SIC Code	Industry	National Industry Percent Share 1999	Total Employment 1999	CAGR of Total Employment 1990–1999
OVERALL CLUSTER			2.1	93,553	6.0
Banking*	6010	Central reserve depository	7.0	3,773	8.8
	6020	Savings institutions	0.5	1,296	-13.9
	6030	Foreign bank and branches and agencies	1.8	4,048	37.2
	6080	Functions closely related to banking	1.6	868	6.5
	6090	Business credit institutions	3.8	4,332	13.7
Securities Services*	6210	Security brokers and dealers	1.5	6,972	9.5
	6230	Security and commodity exchanges	0.1	10	-24.1
	6280	Security and commodity services	1.9	4,156	20.7
	6710	Holding offices	3.3	5,952	7.8
	6799	Investors, n.e.c.	1.4	412	1.1
Insurance Products*	6310	Life insurance	2.1	11,049	-1.8
	6321	Accident and health insurance	1.7	778	7.2
	6330	Fire, marine, and casualty insurance	2.2	13,588	3.0
	6350	Surety insurance	2.2	297	-0.7
	6360	Title insurance	0.4	217	0.0
	6390	Insurance carriers, n.e.c.	1.2	32	0.8
Real Estate Investment*	6798	Real estate investment trusts	3.2	1004	30.7
Tangible Asset Investment*	6220	Commodity contracts brokers, dealers	1.2	221	0.8
Leasing	7515	Passenger car leasing	2.9	261	3.9
Information Providers	2720	Periodicals	2.4	3,005	5.5
	7383	News syndicates	3.9	445	4.7
	8230	Libraries	1.5	455	29.3
Computer and Communication Services	4820	Telegraph and other communications	4.0	28	-21.4
	7372	Prepackaged software	2.6	8,055	12.7
	7375	Information retrieval services	2.8	2,767	18.3
	7376	Computer facilities management	4.2	2,586	47.1
	7377	Computer rental and leasing	2.1	298	2.4
	7379	Computer related services, n.e.c.	2.6	5,660	16.1
Printing Services	2754	Commercial printing, gravure	4.5	1,010	24.6
	2759	Commercial printing, n.e.c.	1.9	2,263	2.4
	2791	Typesetting	2.2	478	-2.3
Related Services	6324	Hospital and medical service plans	1.0	2,967	14.5
	6794	Patent owners and lessors	5.4	1,371	2.6
	7313	Radio, TV, publisher representatives	4.1	1291	12.7
Professional Services	8743	Public relations services	2.3	1,005	9.5
Research Organizations	8733	Noncommercial research organizations	0.7	605	-7.4

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Project has statistically assessed their relative strength compared to other financial service subclusters.

The Atlanta financial services cluster is well represented across the various subclusters; all of the core subclusters have employment greater than the Atlanta average share of national employment. In addition, the share of national employment in each of its subclusters is among the top 20 in the country. However, in some specialized industry segments like investment banking and venture capital firms, the region lacks

a major presence. Moreover, Atlanta does not have a single subcluster in which it maintains a national leadership position in terms of employment share. The financial services cluster in Atlanta is very broad, but not very deep.

The region does have some areas where it is developing more specialized assets. Atlanta is particularly strong in real estate finance, building on the regional tradition of aggressive real estate development. While Atlanta is no longer home base to a major national bank, the cluster has continued to grow through the establishment of major regional bank operations and strong development of real estate, insurance, and financial planning services.

In addition to the broad commercial bank presence, Atlanta has developed a number of the first successful Internet banks, including Security First and Atlanta Internet Bank. Building on its information technology base, the region is known as an area for financial services technology development. Companies like Equifax and TSYS,[75] which develop applications for back-office bank operations like check clearing and credit card processing, are based in the region. Regional banks have also developed a reputation as leaders in embracing technology like ATMs, automatic direct deposit, and Internet bill payment.

The region has also attracted a major international bank presence including world leading banks like ABN Amro, the Bank of Tokyo-Mitsubishi, and Deutsche Bank.

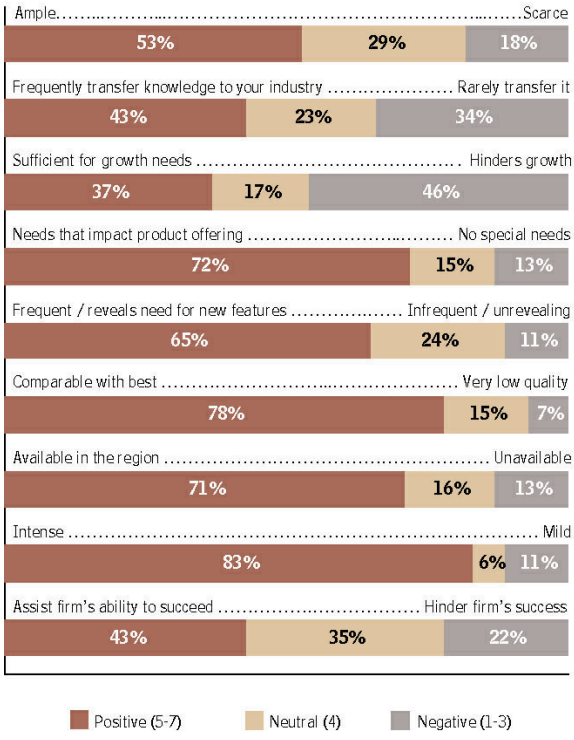
Cluster Competitiveness and Innovative Capacity

Our analysis indicates that Atlanta provides a strong competitive environment for financial services firms. Banks and other financial companies find the region a good place to pilot new consumer and commercial banking services because of the large and broad client base, and access to strong supporting industries in information technology and business services.

Specialized Research. Atlanta is not known as a center for specialized research in financial services, but few U.S. areas outside of New York and Boston could make such a claim. Financial services is not a research-intensive cluster nationally, as much of the innovation takes place in service provision and product development, typically by companies, not research centers. Individual firms and regional university programs do contribute to the creation of new knowledge and new products that are offered.

Specialized Training and Talent Base. Atlanta has a strong university and community college base that provides a wide variety of financial service related programs. Emory, Georgia Tech, and Georgia State offer well-respected MBA programs that offer finance concentrations. Area community colleges offer a broad array of certificate programs for accounting, financial planning, and real estate development/sales professions. In addition to generating new financial services talent, the region's base of large corporations is already home to more than 150,000 middle and upper managers, many of whom have financial responsibilities.[76] Interviewees report satisfaction with the quality of local training and talent, but show some concern about future availability of skilled workers. Forty-six percent of the financial services executives surveyed believed their firms' growth could be hindered by a lack of skilled labor in the future.[77] (See Exhibit 57 for summary of survey results on cluster innovative capacity.)

Exhibit 57: Select Survey Results from the Atlanta Financial Services Cluster



Factors Inputs

- Qualified scientists and engineers in your region are . . .
- The institutions in your region that perform basic research . . .
- The available pool of skilled workers in your region is . . .

Demand Conditions

- Regional customers for your business' products / services have . . .
- Feedback from regional customers to improve your business' products / services is . . .

Related and Supporting Industries

- Regional specialized suppliers of your business' materials, components, machinery, and services are . . .
- Specialized suppliers of your business' materials, components, machinery, and services are mostly . . .

Rivalry

- Regional competition in your industry is . . .

Government

- State and regional government regulations affecting your business . .

Source: Clusters of Innovation Initiative Regional Survey™

Context for Firm Strategy and Rivalry. With thousands of firms and a good concentration of companies in every subcluster, the Atlanta financial services cluster unquestionably provides a highly competitive landscape. A growing number of banks and credit unions compete for consumer accounts. Virtually every major national bank and many major international banks have offices in Atlanta and compete for corporate accounts. The competitive situation for other financial services like insurance and investment management is similar. A full 83% of survey respondents described competition as "intense," and 67% said there were a large number of local competitors.[78] Both rates were well above average across all the regional clusters we surveyed.

Sophistication of Regional Demand. With a growing population and a large base of both established and start-up firms, Atlanta financial institutions serve a wide range of customer needs and preferences. With an increased presence of multinational companies and foreign nationals, the complexity of the services required has also increased. Atlanta financial services executives expressed positive views about the level and sophistication of interaction with their local customer base. More than 72% of financial service respondents reported that their regional customers were sophisticated and demanding, and 65% said that their customers' feedback was a valuable input into new product development.[79] Compared to the overall figures for all regional clusters we studied, this view of regional customers was among the most positive.

Related and Supporting Industries. Atlanta financial service firms have access to virtually every support service they need in the Atlanta region. Information technology and communications providers are highly concentrated in the region and in some cases, are national leaders. The air service at Hartsfield allows financial service firms to serve a national clientele. Relatively low labor costs and a core of highly skilled labor have made nearby Columbus a national center of back-office data processing and bill payment services. Legal and consulting services are well represented.

Most survey respondents (78%) stated that service firms provided services comparable with the best available nationally. Seventy-one percent reported that specialized suppliers were frequently available in the region, while only 13% said they frequently had to go outside the region to source materials, components, or services. The one area where Atlanta seems to still be lacking compared to some competing regions is in locally based investment banking, though access to New York-based firms is not considered difficult. Forty-one percent of cluster respondents stated that specialized suppliers frequently helped them in the innovation process.[80] Each of these ratings was more positive than the average across all regions surveyed. Among the three Atlanta clusters studied, the financial services cluster was the most satisfied with its related and supporting industries.

Government. Government action (and inaction) has had a mixed impact on the development of the financial services cluster in Atlanta.

The greatest impact over the past 20 years is widely considered to be negative. State government laws are widely blamed for the consolidation and loss of bank headquarters to other states in the 1980s. Two sets of state regulations combined to make Atlanta-based banks attractive takeover targets. At the time, Georgia had very restrictive laws on intrastate banking. One important rule, aimed at protecting smaller community banks from being acquired by Atlanta banks, limited Georgia bank holding companies from opening branches in more than three counties over a two-year period.[81]

In 1984, Georgia joined with nine other southern states to allow bank mergers across state lines. Most other southeastern states, including North Carolina, had long had more permissive intrastate banking regulations that allowed banks like Wachovia and First Union to become larger than the Atlanta-based banks. When the law passed, these non-Georgia banks had the financial asset base necessary to acquire leading Atlanta bank holding companies like First Atlanta and First Georgia.

Today, financial service executives are generally positive about state government regulations and the general responsiveness of government to their needs. A number of interviewees commented on the positive impact of the Hope Scholarship programs on the quality of students in Georgia universities, and a number of financial service companies have used the ICAPP workforce development program. Twice as many financial service survey respondents felt that government regulations helped their success rather than hindering it. More than 50% of the financial service survey respondents felt that government's overall responsiveness to the needs of the sector was high.[82]

Institutions for Collaboration. We also asked survey respondents how frequently they interacted with other members of the cluster at the idea generation, product development, and commercialization stages of the innovation process. Results indicate that firms partner with other institutions most often at the idea generation stage, less at the development stage, and least at commercialization. Leaders from one segment of the financial services sector, credit unions, were particularly positive about their industry association, the Georgia Credit Union Association (see next page).

Georgia Credit Union Association/Cooperative Services Inc.

The Georgia Credit Union Association (GCUA) is an example of how an institution for collaboration can bring direct financial benefits to its members. In the early 1990s, the executive director of the association, Mike Mercer, decided to pursue an aggressive campaign to spur collaboration within the association membership in order to compete against local banks.

Starting with the six largest credit unions in the state (of which five were based in Atlanta), Mercer convinced the group to form a joint venture, Cooperative Services Inc, to obtain economies of scale in check collection and processing. By centralizing this back-office function, the six credit unions were able to reduce check-processing costs by an average of 25%. Based on this success, the Association encouraged other credit unions to join the venture. In addition, the GCUA expanded collaboration by negotiating a volume-based contract with Deluxe to print checks for association member institutions at a 50% discount. More recent initiatives include a joint agreement by the member institutions to end ATM service fees for each other's customers and a public relations/marketing campaign to support credit union membership.

Ed Collins, CEO of Atlanta-based Lockheed Federal Credit Union, believes that Cooperative Services Inc has a model for other credit union associations throughout the country. Collins credits the innovation and initiative of Mercer for promoting the initial partnership. "Our association was mostly social and government focused prior to Mercer's arrival. Mike made this happen. And then we ran with it."[83]

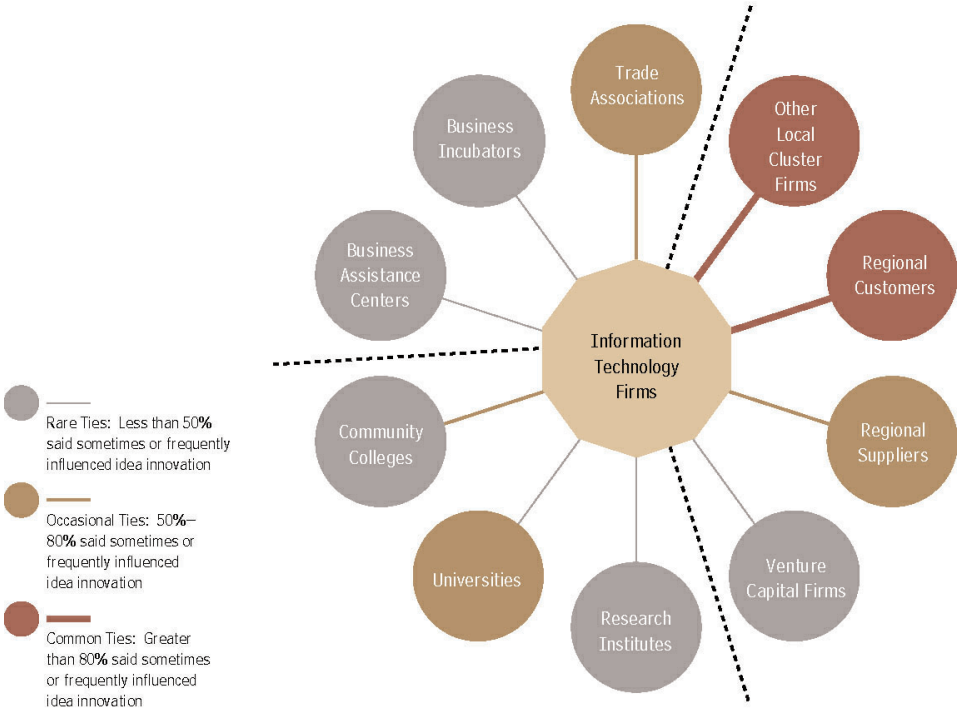
Exhibit 61 summarizes survey findings of interaction on idea generation. According to our survey, financial services cluster firms rely most heavily on other cluster firms and regional customers in their innovation process. This finding is consistent with the sorts of innovations associated with the region – interactive consumer-based services and other technology-supported services designed by firms that sit in the nexus of the information technology and financial services clusters.

Conclusion

Atlanta's financial services cluster provides a number of useful lessons for other regions seeking to develop their own cluster and substantiates several propositions of cluster theory. First, the value of having a broad cluster is apparent. Thanks to the strong presence in each subcluster, Atlanta financial service firms are able to build products and services that incorporate a variety of factors and provided the region with diversification within a large sector.

Second, Atlanta is an example where the intersection of clusters has become a fertile ground for new company and new technology development. The fact that Atlanta has become a center for Internet banking and financial software companies clearly can be traced to the strength of its financial services and information technology clusters. Third, government regulations – in this case regulations designed to protect smaller banks and communities—can have a negative impact on cluster development. However, despite the government restrictions, the quality of life and business environment offered by the region have made it highly attractive to financial service companies. Finally, like most other clusters in the region, the financial services cluster has developed because of the strong transportation and communications infrastructure and promotional efforts by the Chamber and other groups.

Exhibit 58: Frequency of Interaction Among Cluster Members on Idea Generation



Source: Clusters of Innovation Initiative Regional Survey™

THE TRANSPORTATION AND LOGISTICS CLUSTER

Nationally, the transportation and logistics cluster is composed of a broad range of industries that plan, support, and implement the movement of cargo and people. The cluster includes providers of air, bus, train, and marine transportation services as well as the companies that own the hubs from which the transport is staged. Related industries in the cluster include many information technology industries, such as communications equipment manufacturers and service providers. Finally, in each region, various related industry organizations, educational institutions, and government agencies play important roles.

The transportation and logistics cluster is broadly distributed nationally. The area with the highest share of national cluster employment is the Chicago metropolitan area, which has 4.9% of national transportation and logistics employment. Other important metropolitan areas include New York, Los Angeles, and Boston. In Atlanta, the transportation and logistics cluster ranks fifth in total national employment, with approximately 84,200 workers in 1999. While Atlanta has paced the nation's employment growth in the cluster, its wage levels, while growing, have trailed the national average in the cluster.

The Atlanta cluster traces its roots to the founding of Atlanta as a railroad hub in the pre-Civil War South. Today, rail still exists, but has given way to road and air transportation providers. Both cargo and passengers move through Atlanta's Hartsfield Airport, one of the world's largest. Delta Air Lines and United Parcel Service are perhaps the best-known transportation firms based in Atlanta, but the region is home to a number of smaller firms that focus on transportation services ranging from logistics software to Internet travel sites. The region is still home to many regional distribution centers for a variety of consumer goods and other wholesale products.

The region's geographic location provided the initial impetus for the cluster's growth. However, major efforts by community leaders to improve the transportation infrastructure and attract transportation and logistics companies have played a critical role in creating a strong competitive environment for the cluster. Georgia Tech, with its Logistics Institute, is home to one of the nation's leading research centers. Over the past decade, Atlanta has become a nationally leading region for locating transportation software firms as well as logistics consulting practices.

However, beyond the largest firms, firms and institutions in the regional transportation cluster seem to be only loosely connected. Respondents report very little interaction with each other and smaller firms have no real regional associations. The regional cluster patenting output, which is only about 20% of the national average for the cluster, may reflect a lack of innovation. In addition, the rising cost of labor and land within the metro area is forcing some distribution and trucking operations to move outside of the area. The short-term impact of the September 11 attacks has been highly negative for regional cluster firms, and the long-term impacts of increased security are of concern to regional cluster leaders.

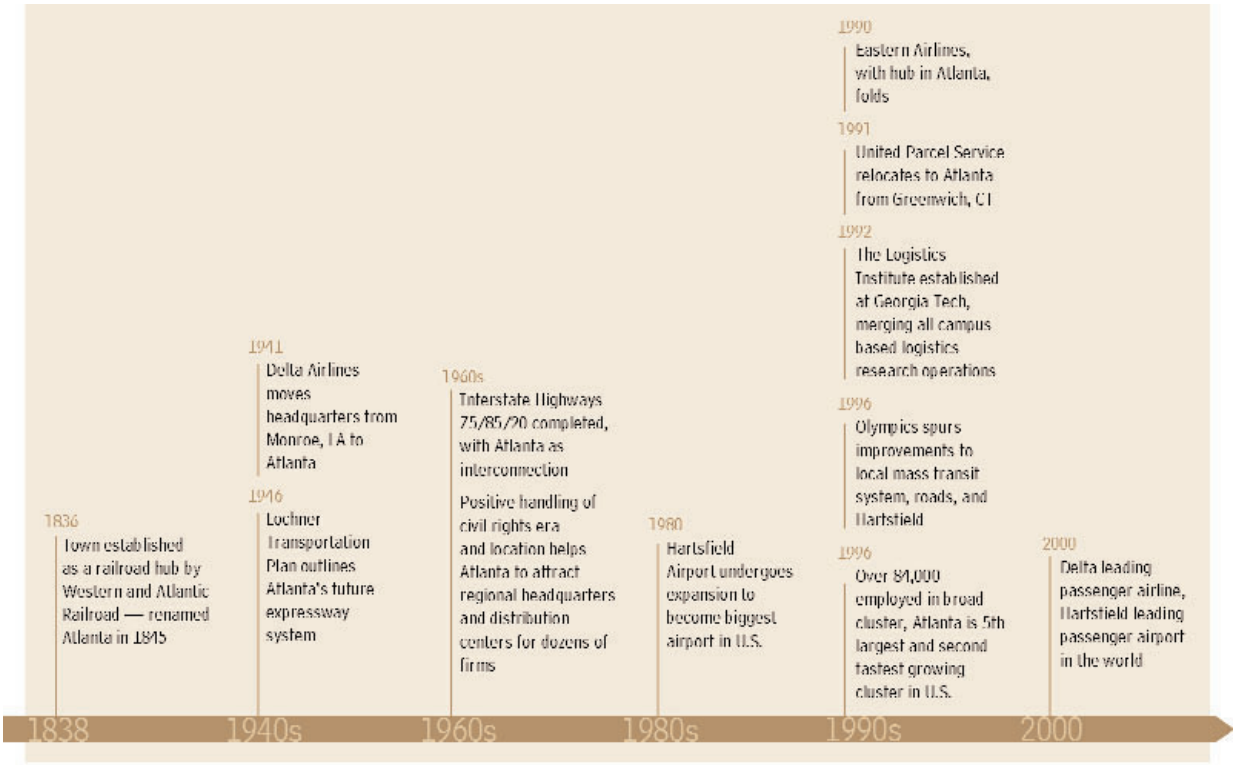
Development of Atlanta's Transportation and Logistics Cluster

Atlanta owes its existence to the development of railroads. In 1836, the Georgia General Assembly authorized the construction of a railroad from the Chattahoochee River to the Tennessee River. The next year, the surveying team picked a spot a few miles west of Decatur to place the southern terminus of the new Western and Atlantic railroad. With this decision, Atlanta was born.[84]

The goal of the state-run railroad was to attract other private rail companies to build connecting lines. They did, starting with the Georgia Railroad and the Macon and Western. By the time of the Civil War, Atlanta was established as the transportation hub of the South. After the war, rebuilding the four railroads that served the city was the primary focus of the state and local governments. In the late 1800s additional railroads chose to serve Atlanta, cementing its position as the primary rail hub in the region. The region continues in that role today.[85]

By the 1940s, however, rail had given way to road and air as the primary strengths of the Atlanta transportation and logistics cluster. In 1946, the state and region adopted the Lochner Plan for Atlanta. The plan is credited with being the first national comprehensive transportation plan with limited access highways and transit components. Massive road construction continued through the mid century, including the construction of Interstates 20, 75, and 85 by the federal government. In the 1970s, Interstate 285, the perimeter highway, was opened. The development of these interstates and Atlanta's preferential location have been critical in attracting the hundreds of warehouse operations and trucking companies that operate in Atlanta.[86]

Exhibit 59: Atlanta Transportation and Logistics Cluster Timeline



Source: Pomerantz, *Where Peachtree Meets Sweet Auburn*, Project Interviews, *Atlanta Business Chronicle*, Websites

Atlanta's strength in air transportation can be traced back to 1930, when both Eastern and Delta Air Lines began offering passenger service in Atlanta. In 1941, Delta moved its headquarters to Atlanta, and under its CEO, C.E. Woolman, began to expand into one of the nation's largest airlines. Regional counties and the State of Georgia have helped the region develop its airport infrastructure by consistently investing in airport expansion at Hartsfield Airport. From its opening in 1959, regional leaders have consistently

pushed to ensure that the airport had world-class facilities. With the exceptions of a few setbacks, like the bankruptcy of Eastern in 1990, Hartsfield has seen continued growth in passengers, airline service, and cargo over the past 30 years. Today, the airport is the busiest passenger airport in the world and serves as a major economic development asset in efforts to attract corporate headquarters to the region.

Recent Economic Performance

Employment. In 1999, the Atlanta MSA had the fifth largest transportation and logistics cluster in the country, and the second fastest growing out of the 20 largest clusters in the United States (see Exhibit 60). More than 84,000 people work in the regional cluster, with nearly 50,000 of those joining the cluster workforce between 1990 and 1999. Much of this impressive job growth was spurred by the rapid growth of Delta and other airlines and airline service companies based at Hartsfield. More than 30,000 new jobs related to air transportation were added over the decade.

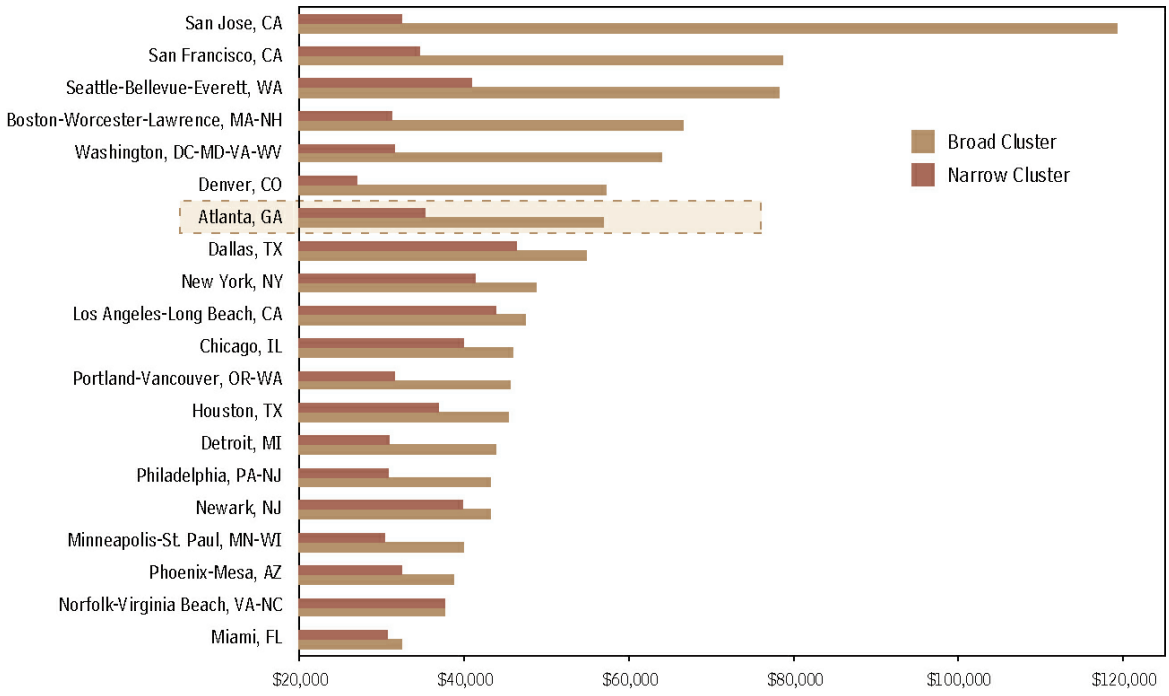
Exhibit 60: Top 20 Regions for Transportation and Logistics Employment, 1999

Metropolitan Area	1999 Total Employment	Average Annual Employment Growth, 1990–1999 (%)	1999 Employment Location Quotient	1999 Share of National Cluster Employment
Chicago, IL	111,125	4.3	1.4	4.9
Los Angeles-Long Beach, CA	107,421	3.5	1.4	4.7
New York, NY	94,849	0.2	1.3	4.2
Boston-Worcester-Lawrence, MA-NH	91,443	7.9	1.5	4.0
Atlanta, GA	84,171	10.6	2.0	3.7
Washington, DC-MD-VA-WV	69,586	6.4	1.6	3.1
Dallas, TX	66,426	5.8	1.8	2.9
Minneapolis-St. Paul, MN-WI	61,978	6.8	1.9	2.7
San Francisco, CA	61,110	2.9	3.0	2.7
Houston, TX	60,168	5.4	1.6	2.7
Seattle-Bellevue-Everett, WA	58,351	5.4	2.3	2.6
Miami, FL	49,665	3.1	2.8	2.2
San Jose, CA	44,910	11.3	2.3	2.0
Philadelphia, PA-NJ	43,460	5.5	1.0	1.9
Newark, NJ	41,996	6.0	2.3	1.9
Phoenix-Mesa, AZ	40,802	6.3	1.5	1.8
Detroit, MI	39,643	6.8	1.0	1.8
Denver, CO	38,608	5.8	1.9	1.7
Norfolk-Virginia Beach, VA-NC	32,146	-0.4	2.8	1.4
Portland-Vancouver, OR-WA	30,330	6.3	1.8	1.3

Note: Broad Cluster Definition
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Average Wages. Atlanta transportation and logistics firms paid average wages of $57,000 in 1998, a level higher than 13 of the largest 20 national clusters (see Exhibit 61). Wages have been increasing at more than 7% a year in the 1990s, the sixth fastest growth rate among the top 20 clusters. The wage growth that Atlanta "core" transportation workers enjoyed was concentrated in the transportation arrangement subcluster.

Exhibit 61: Largest Regional Transportation and Logistics Clusters, Average Wages



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

THE NARROW CLUSTER VIEW

In the transportation and logistics cluster, the core subclusters that make up the "narrow" cluster include air transportation and airports, marine transportation and ports, bus transportation and terminals, transportation arrangement, and handling and storage. The employment in the narrow cluster is 67,850 or 78% of the broad cluster employment. The subcluster with the greatest impact on the difference in employment is the computer services and equipment subcluster, which supports more than 6,000 jobs.

The high wages paid in this subcluster also inflate the average wages in the transportation cluster nationally and in Atlanta. If only narrow cluster industries are considered, the average wage for the top 20 transportation and logistics clusters falls from $54,400 to $35,300. In Atlanta's case specifically, the average wage for the narrow cluster was $35,200 in 1999, dropping the region to ninth in the top 20.

Atlanta narrow cluster transportation and logistics wages still show growth over the 1990 to 1999 period, but only at 2.1%, which was 13th of the top 20.

Patents. While the generally low patenting output of transportation and logistics clusters nationally makes comparisons difficult, Atlanta seems to fare poorly against its large competitors. Out of the 20 largest transportation and logistics regions, Atlanta ranks 18th in patents per employee. On the positive side, Atlanta was the second-fastest growing of the top 20.

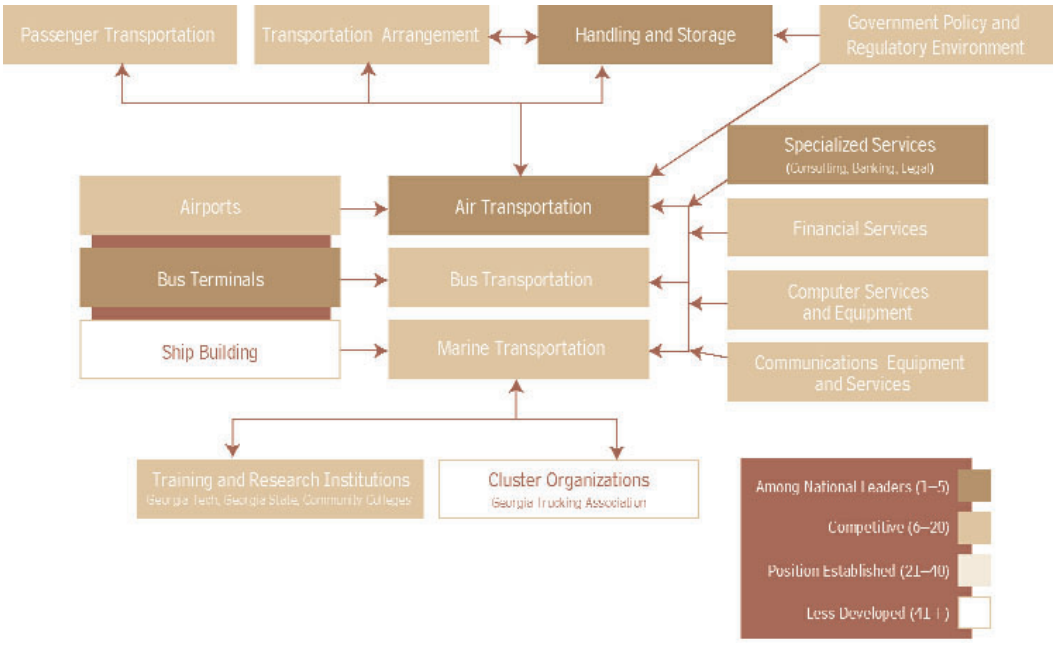
Establishments. In 1999, Atlanta had nearly 1,140 "core" transportation and logistics establishments in the region, making it the eighth largest in the country. Its annual growth rate of 6.0% over the period helped the region add nearly 500 new establishments. The largest growth was in the transportation arrangement subcluster.

Investments/Venture Capital Funding. According to the PriceWaterhouseCoopers Money Tree database, Atlanta regional retail and distribution firms raised $40 million in venture capital funds from 1995 to the first quarter of 2000, or 0.5 % of the national total over this period.[87] Most of this relatively small investment was focused on e-commerce-based retail firms. The lack of funding reflects the dual nature of the industry. There are a number of large, publicly traded companies that no longer need venture capital, multiple distribution centers that are parts of other larger companies, and a large group of smaller companies that are too small or uninterested in venture funding.

Competitive Position of Atlanta's Transportation and Logistics Cluster

The Atlanta transportation and logistics cluster is shown in Exhibit 62. Five boxes (Specialized Services, Specialized Risk Capital, Training Institutions, Cluster Organizations, and Government Policy and Regulatory Environment) represent related organizations and institutions that are important components of the Atlanta transportation and logistics cluster; they are assessed qualitatively through interviews and surveys. The remaining boxes are the industry-based subclusters present in the region, and their relative strength has been statistically assessed through the Cluster Mapping Project data set. Subclusters that are among the

Exhibit 62: Atlanta Transportation and Logistics Cluster



Source: Clusters of Innovation Initiative Regional Survey™ Data, Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School and In-person interviews

five largest nationally appear in dark blue, "competitive" clusters that fall in the 6th through 20th spots nationally are green, and clusters with an "established position" in the top 40 appear in light blue.

The Atlanta transportation and logistics cluster includes leading firms in airlines, package delivery, transportation arrangement, and management. Building on its historical roots, Atlanta continues to have a strong warehousing and distribution sector that has grown significantly with the growth of the Southeast. A growing number of major national retailers like Whirlpool, Ford, and PepBoys maintain large distribution centers in the region. Large employers include Delta Air Lines, UPS, Norfolk Southern, and Home Depot's logistics operations. Fast-growing small transportation and logistics software firms (at least through 2000) include Manhattan Associates and American Software. Atlanta offers a very strong set of support services for transportation and logistics firms—including specialized consulting, accounting, and legal services. Exhibit 63 shows the relative size and growth of the subclusters within Atlanta.

With the exception of marine transport, all of the core subclusters in Atlanta are either at or above the expected regional share of national cluster employment (1.8%). Atlanta's transportation cluster is clearly

Exhibit 63: Atlanta Transportation and Logistics Cluster Subclusters and Industries

Subcluster	SIC Code	Industry	National Industry Percent Share 1999	Total Employment 1999	CAGR of Total Employment 1990–1999
OVERALL CLUSTER			3.7	84,171	10.6
Air Transportation Carriers*	4510	Air transportation, scheduled	6.2	48,300	10.1
	4520	Air transportation, nonscheduled	3.9	2,240	27.6
Bus Transportation*	4130	Intercity and rural bus transportation	1.7	375	5.3
Marine Transportation Carriers*	4410	Deep sea foreign transportation of freight	2.8	420	14.9
	4420	Deep sea domestic transportation of freight	0.0		
	4482	Ferries	0.0		
	4499	Water transportation services, n.e.c.	0.2	25	-2.2
Transportation Arrangement*	4724	Travel agencies	2.4	4,376	4.0
	4730	Freight transportation arrangement	2.9	4,658	7.7
Handling and Storage*	4221	Farm product warehousing and storage	0.6	30	13.0
	4222	Refrigerated warehousing and storage	8.9	2,254	19.1
	4226	Special warehousing and storage, n.e.c.	3.2	712	5.5
	4230	Trucking terminal facilities	8.2	29	12.6
	4491	Marine cargo handling	0.0	-	-100.0
Airports*	4580	Airports, flying fields, and services	1.7	2,214	7.5
Bus Terminals*	4170	Bus terminal and service facilities	8.2	34	-7.6
Ship Building*	3731	Ship building and repairing	0.0	-	
Passenger Transportation	4481	Deep sea passenger trans., ex. ferry	0.0	-	
	4489	Water passenger transportation, n.e.c.	0.3	31	13.2
	4725	Tour operators	1.1	440	4.1
	4729	Passenger transport arrangement, n.e.c.	3.7	1,632	34.7
Communication Equipment and Services	3669	Communications equipment, n.e.c.	0.8	190	0.3
	4820	Telegraph and other communications	4.0	28	-21.4
Computer Services and Equipment	3575	Computer terminals	18.5	770	-2.1
	3577	Computer peripheral equipment, n.e.c.	2.4	1,978	28.0
	7372	Prepackaged software	2.6	8,055	12.7
	7375	Information retrieval services	2.8	2,767	18.3
	7376	Computer facilities management	4.2	2,586	47.1
Financial Services	4740	Rental of railroad cars	2.5	29	-5.9

Source: CMP, Institute for Strategy and Competitiveness, Harvard Business School

being led by growth in air travel. Job growth at airlines and at airports has accounted for the majority of the cluster's advancement over the decade—though given the post-September 11, 2001 decline in air travel, this job growth is unlikely to continue. Only one "core" subcluster, bus terminals, lost employment from 1990 to 1999.

Cluster Competitiveness and Innovative Capacity

Our analysis indicates a strong business environment has emerged, based on a strong transportation infrastructure and the existence of leading national players in a variety of transportation and logistics fields. Local educational institutions support the cluster through their training programs and, to a lesser degree, their research.

Specialized Infrastructure. Atlanta's transportation and logistics cluster is centered around Hartsfield Airport. Hartsfield is the world's busiest passenger airport and the 20th largest cargo airport. Over the past decade there have been major expansions to the cargo facilities, including the development of a specialized Equine Center and the Atlanta Perishables Center. The latter has enabled the airport to make some inroads into attracting Latin American flowers and fruit exporters away from their traditional Miami hub. The airport property and the surrounding area host dozens of cargo warehouses and distribution operations.

Atlanta continues to be a national rail center and the key hub for the southeastern United States. Both CSZ and Norfolk Southern have massive intermodal operations in Atlanta that serve regional shippers. Atlanta's highway infrastructure also supports its position as a regional warehouse and distribution location. It is only one of five cities to be served by three major interstate highways (I-20, I-75, I-85). The State of Georgia has also been an aggressive investor in new state highways, helping to connect Atlanta to the rest of the state and region. Population and business increases have led to increasingly worse traffic congestion. Nevertheless, Atlanta business people still rank their overall transportation infrastructure higher than any other region in our study. Nearly 60% of respondents thought the overall transportation infrastructure was better than that of most other cities.[88] It is clear, however, that much of this satisfaction is derived from positive attitudes toward the airport, not the road infrastructure. (See Exhibit 75 for summary of survey results on cluster innovative capacity)

Specialized Research Centers. Atlanta is home to one major research center focused on the transportation and logistic sector: the Logistics Institute at Georgia Tech. The Logistics Institute, though based in Atlanta, considers itself to be a national research center and attracts members primarily from the ranks of the Fortune 500. However, many of the members are Atlanta-based, including Delta, Home Depot, UPS, and Norfolk Southern. The Institute sponsors research projects in logistics management and supply chain management that are of specific interest to its members. In addition, it hosts a series of conferences and training seminars available to the public.

The Logistics Institute: Industry-University Partnership

The Logistics Institute at Georgia Tech (TLI) supports a broad number of academic and research programs, focusing on "logistics people, processes and problems." Critical to its mission is the involvement of the logistics industry in those programs. To organize industry participation, the Institute has created a sponsorship group known as Leaders in Logistics that has more than 20 members.

Member firms contribute an annual fee in order to support TLI's research and educational programs. Specifically each firm has access to:

- In-context research projects: projects specifically tailored to the interests of the individual company. Often these projects extend over years and are led by professors who develop relationships with the firms.
- Generic/collaborative research: projects aimed at creating new knowledge and tools relevant to the logistics community
- Professional education: general and firm-specific training on logistics management and operations

The annual contribution for member companies is $50,000 or $25,000 for small-business members. Part of the contribution provides specific funding for a TLI graduate student to work with the professor leading the company-specific project. Research results are shared with the Leaders in Logistics partners through annual research reports and individual firm meetings.[89]

While the Logistics Institute serves larger players, the annual membership dues are out of reach for most of the small and medium sized firms. This may have been driving some of the relative dissatisfaction expressed by cluster executives surveyed – only 35% said that local research institutions frequently transferred knowledge to the industry. Still, by simply having a well-established research institute, Atlanta offers something to transportation and logistics firms that most competing regions do not.

Specialized Educational Institutions and Talent Pool. Atlanta is home to a comparatively large number of skilled workers in the transportation and logistics cluster. While the cluster has a broad scope, interviewees ranging from logistics software designers to trucking companies agreed that Atlanta had a "thick" labor market due to the large concentration of transportation and logistics firms. The region hosts a large number of technical schools aimed at transportation occupations as well as numerous engineering programs at the university level. Seventy-two percent of cluster survey respondents said that local schools provided high-quality employees.[90] Many commented that Georgia Tech was a strong asset. According to one interviewee, "Georgia Tech has the finest industrial engineering school in the country, including strong offerings in airline and transportation engineering."[91]

Nevertheless, most regional transportation and logistics executives are concerned about present and future access to employees. Many of the firms involved in road transportation as well as services like freight-forwarding commented that they were having trouble finding and keeping employees as competition for workers intensified late in the decade. While the slowing economy has increased labor availability, 48% of the executives we surveyed felt that that the supply of skilled labor in the region was too scarce to meet their expansion needs.[92]

Sophistication of Regional Demand. Atlanta's local demand for transportation and logistics service has been a boon to the development of the cluster. The large base of retail stores and southeastern distribution centers provides a large client base and ensures that trucks can leave Atlanta and almost certainly obtain a back-haul load. This means that in comparison to places like Miami, where often trucks return empty, Atlanta-based firms can charge lower fees to clients only interested in shipping one-way. Atlanta is also home to some of the largest and most sophisticated logistics consumers in the world, including CocaCola and Home Depot. One of the factors (along with cost of business and quality of life reasons) that drove UPS to move its headquarters to Atlanta from Connecticut in 1991 was the greater access to demanding customers offered by the region.

Transportation and logistics providers believe that the local market provides an excellent basis for competition. More than 74% of cluster respondents reported that their regional customers were sophisticated and demanding while 68% said that their customers' feedback was a valuable input into new product development.[93] Across all clusters studied, only 50% of respondents felt customers provided valuable feedback.

Related and Supporting Industries. Transportation and logistics executives expressed reasonable satisfaction with their access to specialized suppliers but did not feel regional suppliers provide the cluster firms with a particular competitive advantage. Indeed, some executives in the motor transportation field complained that there was little interaction with suppliers—other than haggling over price. Sixty-eight percent of the respondents reported their regional suppliers of components, materials, and services are comparable with, or better than, the quality of inputs found elsewhere, and 53% said they can source most of their inputs from sources within the region. A substantial minority of 27%, however, reported that they frequently go outside the region for supplies.[94] Only about 30% of the respondents consider their specialized suppliers as frequent contributors to their innovation efforts, well below average across all regions.[95]

Context for Firm Strategy and Rivalry. The Atlanta transportation and logistics cluster exhibits rapid growth of new firms, moderate competitive rivalry, and sporadic collaboration among firms.

Over the past ten years, the number of transportation and logistics establishments has almost doubled, marking increased competition throughout the cluster, particularly in the trucking and transportation arrangement fields. In the air transportation area, a number of new airlines, notably Air Tran, have established operations in Atlanta to compete against Delta, by far the leading carrier in the region.

Sixty-eight percent of survey respondents described competition in their cluster as intense. Sixty-two percent stated there were many firms competing in the industry, whereas 27% claimed there were average to few firms competing locally.[96] Response levels were average relative to other regions for both questions.

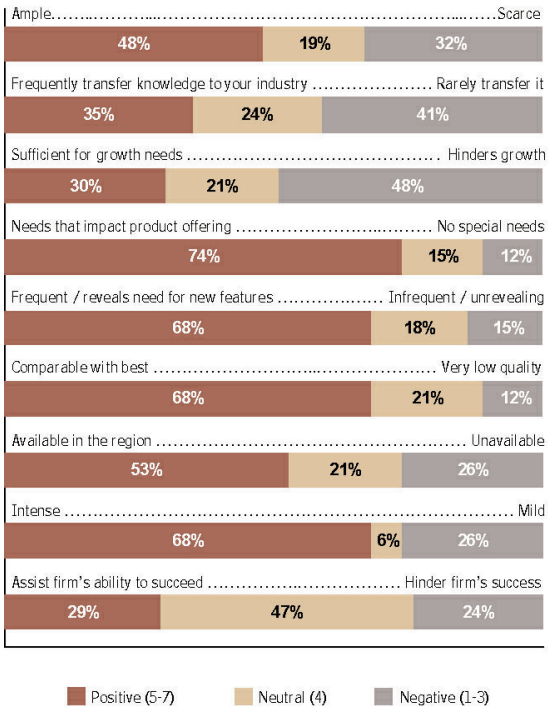
Executives in the Atlanta transportation and logistics cluster have mixed views about the amount of firm-level collaboration that exists in the region. Motor carriers interviewed felt little collaboration existed and complained about "raids" on best employees. Others, including those involved in logistics and transportation planning, felt there was more collaboration.

Government. Government entities have been critical contributors to the growth of innovative capacity in the cluster. At the federal level, investment in interstates and also defense-related investments in transportation manufacturing have spurred cluster growth. At the state level, funding for airport expansion, along with a top-notch state road system, has assisted the cluster. So too has state investment in higher education institutions, particularly engineering programs at Georgia Tech. Local leaders like mayors Maynard Jackson and Coleman Young have kept transportation issues, particularly the airport, on the front burner of state and federal funding sources.

Today, however, transportation and logistics executives have mixed views about the effectiveness of government. Of the three clusters examined in Atlanta, transportation and logistics respondents were the least satisfied with government's regulatory impact on their cluster. Only 29% (versus 44% and 45% in financial services and information technology, respectively) felt that government regulations were appropriate and assisted their ability to succeed in the market.[97] One critical area of concern is the ineffective regional transportation planning that has been unable to curb the increases in traffic that hinder road transport providers. In addition, transportation and logistics executives expressed concern over general regional issues like poor K-12 education and the rising cost of living.

Institutions for Collaboration. The transportation and logistics cluster in Atlanta is served by a number of connective organizations, including the Georgia Motor Transport Association, the Transportation Intermediaries Association, Atlanta Maritime Association, Georgia Air Transportation Association, and the Georgia Freight Bureau. As evidenced by their names, these associations focus on specific types of transportation companies, not the integrated cluster. For some larger players, the Logistics Institute serves as a cross-cluster institution that spurs collaboration with each other and Georgia Tech.

Exhibit 64: Select Survey Results from the Atlanta Transportation and Logistics Cluster



Factors Inputs
- Qualified scientists and engineers in your region are . . .
- The institutions in your region that perform basic research . . .
- The available pool of skilled workers in your region is . . .

Demand Conditions
- Regional customers for your business' products / services have . . .
- Feedback from regional customers to improve your business' products / services is . . .

Related and Supporting Industries
- Regional specialized suppliers of your business' materials, components, machinery, and services are . . .
- Specialized suppliers of your business' materials, components, machinery, and services are mostly . . .

Rivalry
- Regional competition in your industry is . . .

Government
- State and regional government regulations affecting your business . .

Source: Clusters of Innovation Initiative Regional Survey™

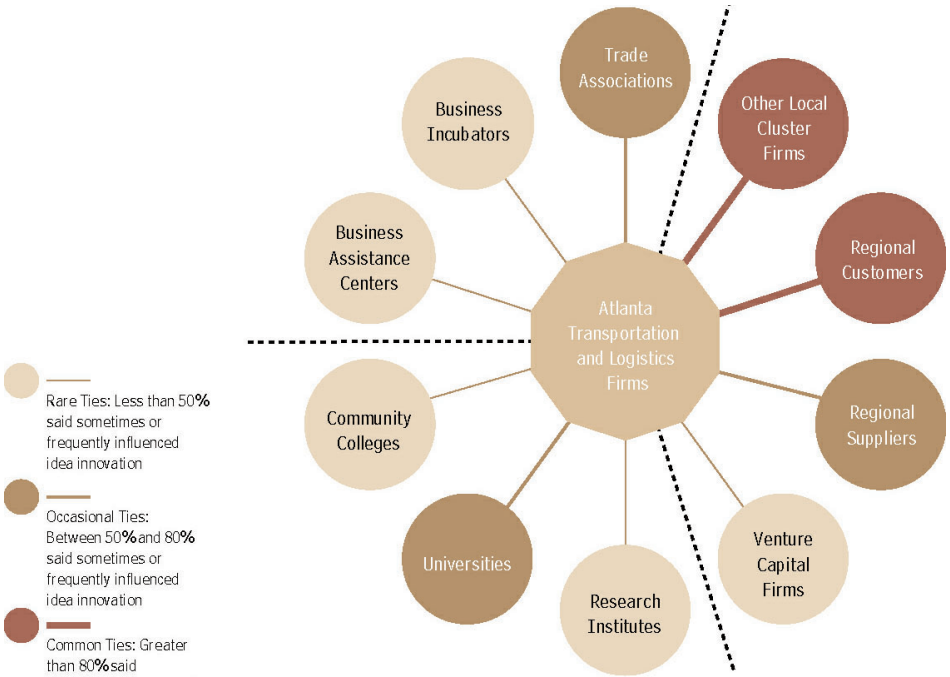
Despite the wide range and number of associations, cluster participants do not believe these institutions play an important role in supporting collaboration or diffusing innovation. Only 38% of cluster survey respondents felt their associations were effective intermediaries while 34% characterized them as ineffective. In comparison, 44% of all transportation and logistics respondents felt their industry associations effectively promoted their interests, below the Atlanta overall average of 52%.

Only 26% of respondents felt that firms in the sector frequently participated in cluster-wide initiatives, while 42% said that firms rarely worked together on common issues.[98] In the debate about how to improve traffic flow in Atlanta, for instance, the transportation industry associations are rarely cited as key players in the discussion. The comments of one transportation broker are representative, " In my opinion, the associations in the region are not that important. They do provide good social events and networking. Sometimes they are also effective lobbyists." [99]

We also asked survey respondents how frequently they interacted with other members of the cluster at the idea development and commercialization stages of the innovation process (see Exhibit 65). In Atlanta, transportation firms are more likely to use partners to generate new ideas than they are to jointly develop or commercialize an idea. However, most new ideas and products are developed internally.

When transportation and logistics firms use outside partners, they rely most commonly on regional customers and other cluster firms. Regional customers push innovation by requiring faster delivery or new product packaging and service requirements. Other firms, particularly logistics software companies, promote innovation by enabling more precise logistics and higher service quality. As one logistics software executive stated, " It's great to have UPS here. We also benefit from having large Arthur Andersen and Deloitte logistics practices pushing us to improve."[100]

Exhibit 65: Frequency of Interaction among Transportation and Logistics Cluster Members on Idea Generation



Source: Clusters of Innovation Initiative Regional Survey™

Conclusion

Atlanta's transportation and logistics cluster is an instructive case for several reasons. First, it shows that simple geography can play a critical role in the launch of a cluster. Were Atlanta located further south, it is unlikely it would have become the regional transportation hub. However, there were many other places, Birmingham and Chattanooga, for example, that could have filled that role. It took a series of decisions made by state and regional leaders to develop a high-quality transportation infrastructure to win Atlanta's place. Starting with the construction of the initial rail terminus and continuing through the multiple investments in Hartsfield Airport, public sector involvement has been critical to the development of the cluster. The success of early firms, both railways and airlines like Delta, helped develop the local interest in expanding the cluster. The more recent success of Delta, UPS, and Norfolk Southern – leaders in three types of transport—has helped Atlanta by attracting a large number of smaller service providers to the regional cluster. Public relations, managed by the city and the Chamber of Commerce, also played a role in developing the region. Atlanta took the name "The Gate City" in 1857—well before the region could claim to be the transport center of the South.

THE INFORMATION TECHNOLOGY CLUSTER

Nationally, the information technology cluster is composed of a variety of industries that provide both hardware and software technologies, including enabling systems for other technologies as well as end-user products like computers and cellular phones. The cluster also includes information service, research, legal, and consulting providers. The metropolitan area with the highest share of national cluster employment is San Jose/Silicon Valley, with 7.4 % of broad cluster employment. Boston, Washington-Northern Virginia, and Chicago are the next largest regions. Over the past decade, the nation has seen a very large increase in the number of jobs and firms in information technology fields. In U.S. metro areas, more than 50,000 new establishments and 700,000 new jobs have been created over the decade.

The information technology cluster in Atlanta is diversified, with broad representation in most of the subclusters in the national cluster. The cluster has particular strength in software, peripherals and computer distribution and services. Cluster firms have grown rapidly in terms of both employment—adding more than 30,000 jobs from 1990 to 1999 and establishments—nearly tripling the number of establishments from slightly more than 1,000 to 3,000.

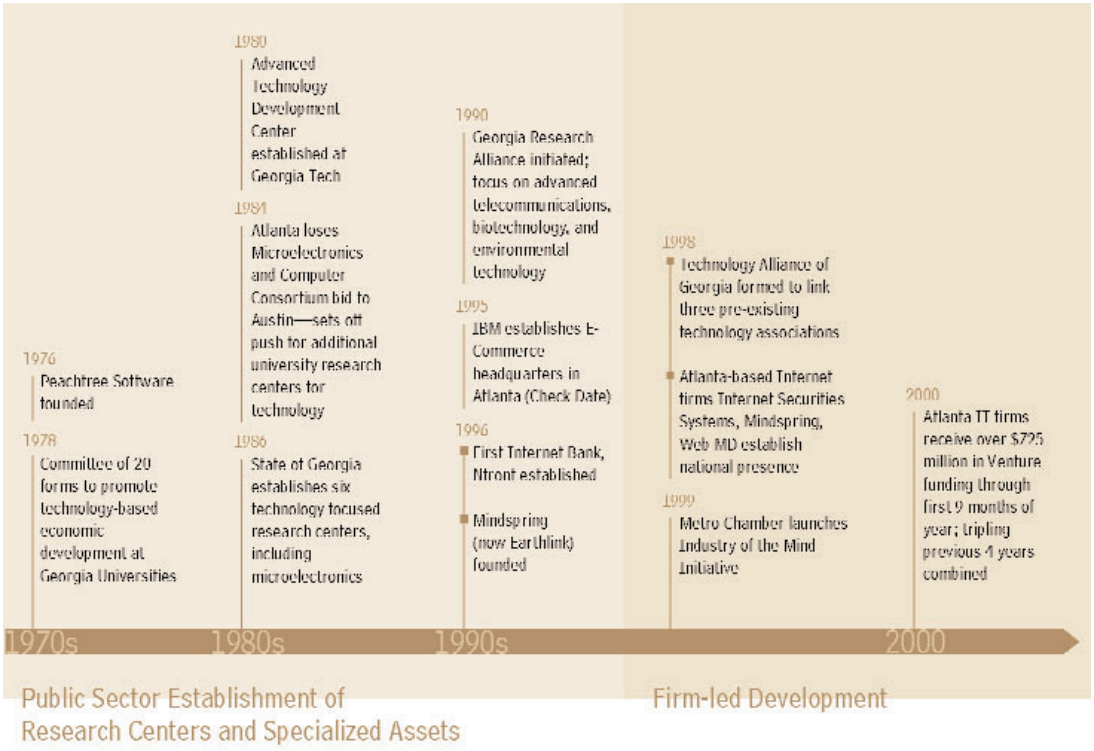
Our assessment of the innovative capacity of the Atlanta cluster shows the importance of having strong higher education offerings in the region, as well as the positive impacts of state-sponsored research programs aimed at spurring collaboration among info tech firms. The cluster also benefits from strong regional and cluster-specific institutions for collaboration, the existence of a strong communications infrastructure, and a growing number of companies that are gaining national recognition due to their success.

The cluster is challenged by rising costs of labor, transportation jams on area roads, and the recent economic downturn that has been exacerbated in the wake of the September 11 attacks.

Development of Atlanta's Information Technology Cluster

Atlanta's information technology cluster draws its roots from Atlanta's historical strengths in telecommunications and more recent strength in media companies. In the 1960s and 1970s, telecom companies like AT&T (Southern Bell), GTE, and WorldCom expanded operations as the region grew and telecom expanded throughout the country. Turner Broadcasting, CNN, and Cox Communications were established in the 1980s to offer both cable service and new television content. These companies found Atlanta to be fertile ground because of its skilled technical workforce that remained in the area after World War II and the strong flow of new talent provided by Georgia Tech's industrial and electrical engineering programs.

Exhibit 66: Atlanta Information Technology Timeline



Source: Project Interviews, *Atlanta Business Journal*, PriceWaterhouseCoopers

In the late 1970s and early 1980s two software companies, Management Science America and Peachtree Software, enjoyed strong growth, and when sold to larger companies, made their leadership teams wealthy. The success of these firms and their founders did not result in an immediate boom in software or info tech firms, as was the case in other smaller regions. Instead, the impact of these firms' success was somewhat "lost" in the economy of a major metro area where big companies, major banks, and real estate developers were the primary job providers and held public "mindshare."

It was not until 1997-98, with the success of Mindspring, one of the first large national Internet service providers, that a widely recognized anchor firm developed. Mindspring's success and a growing national market encouraged other Internet-based entrepreneurs to expand businesses based in Atlanta including iXL, a web developer, and Internet Security Services, an Internet security firm. The business communi-

ty, universities, media, and existing venture capital firms lined up to support the development of Internet firms in the wake of these successes and the growing recognition that the "new" economy was real. From 1995 to 2000, hundreds of new firms were formed in the cluster, many of which drew on local strengths by focusing on communications technologies, tourism, and financial services. The region also became a major center for distribution of technology hardware and software.

Through 2000, the cluster was facing a problem common to all information technology clusters nationally—the lack of skilled labor to support continued fast growth. With the economic downturn, finding skilled labor is less of an issue, although some cluster members still feel that the pool of experienced management talent is weak compared to competitive regions. IT cluster members are highly concerned about the decline in quality of life indicators like traffic and environmental pollution.

Recent Economic Performance

Employment. In 1999, the Atlanta information technology cluster supported close to 60,000 broad cluster jobs, or 2.2% of total national IT employment (see Exhibit 67). The cluster showed compound annual growth of nearly 9% over the decade, which allowed it to move from 17th to 9th largest of all national information technology clusters. Growth was led by increases in software and Internet firm employment as well as in technology product distribution.

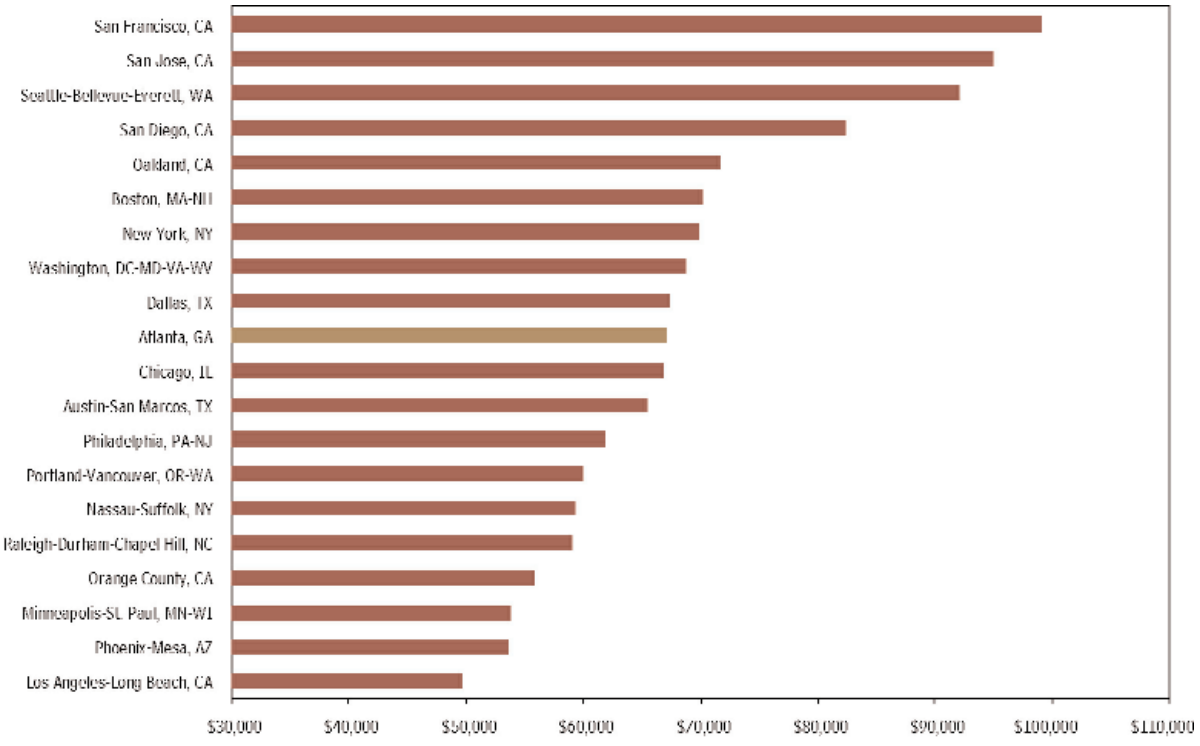
Exhibit 67: Top 20 MSAs for Information Technology Employment, 1999

Metropolitan Area	1999 Total Employment	Average Annual Employment Growth, 1990–1999 (%)	1999 Employment Location Quotient	1999 Share of National Cluster Employment
San Jose, CA	207,154	2.6	8.7	7.4
Boston-Worcester-Lawrence, MA-NH	174,805	2.2	2.4	6.2
Washington, DC-MD-VA-WV	129,943	6.1	2.4	4.6
Chicago, IL	115,421	2.6	1.2	4.1
Los Angeles-Long Beach, CA	94,164	0.3	1.0	3.3
Dallas, TX	90,189	6.6	2.0	3.2
Orange County, CA	76,287	2.6	2.3	2.7
San Diego, CA	64,689	7.1	2.5	2.3
Atlanta, GA	60,522	8.9	1.2	2.2
New York, NY	57,227	2.9	0.6	2.0
Philadelphia, PA-NJ	54,639	3.2	1.0	1.9
Minneapolis-St. Paul, MN-WI	54,370	2.7	1.3	1.9
Austin-San Marcos, TX	54,143	7.3	4.2	1.9
Oakland, CA	53,163	5.4	2.3	1.9
Phoenix-Mesa, AZ	49,946	2.9	1.5	1.8
San Francisco, CA	48,937	7.3	2.0	1.7
Seattle-Bellevue-Everett, WA	48,181	9.4	1.6	1.7
Raleigh-Durham-Chapel Hill, NC	44,080	1.4	3.1	1.6
Portland-Vancouver, OR-WA	41,505	8.7	1.9	1.5
Nassau-Suffolk, NY	38,378	0.7	1.4	1.4

Note: Broad Cluster Definition
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Wages. Average wages paid in the Atlanta cluster rank tenth among the largest 20 clusters, and have been increasing at 5.4% percent a year in the 1990s (see Exhibit 68). The average Atlanta IT worker saw her salary rise from $41,800 to $67,000 over the period. Despite this impressive increase, the Atlanta regional wage actually dropped relative to the top 20 IT regions. Average wages in the top 20 regions grew at more than 7% a year over the period. Regions like San Francisco, San Diego, and Seattle, with particularly strong equipment and software design sectors, started the decade below Atlanta, but by the end were all paying an average wage $20,000 higher than Atlanta.

Exhibit 68: 1999 Average Wages in 20 Largest Information Technology MSAs



Note: Broad Cluster Definition
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Patents. Over the past ten years, Atlanta IT firms have been steadily increasing their rate of patenting (see Exhibit 80). In 1999, regional firms received 170 patents, more than triple the amount they received in 1990. However, like the region as a whole, Atlanta IT firms lag their competitors in competing regions. In 1999, Atlanta, with 3.0 patents per 1,000 IT employees, ranked 18th of the top 20 in patenting per employee. Leading regions like Austin, Silicon Valley, and San Francisco all reported ratios of greater than 10 patents per 1,000 employees and maintained a faster growth rate than Atlanta.

Establishments. The number of establishments in the Atlanta MSA grew from 1,088 to 3,069 over the period, an impressive 12.2 percent annual growth rate. This pace helped Atlanta to move from the 12th to 7th largest region for IT establishments. Boston, with more than 5,400 establishments, was the top region.

Exhibit 69: Total Patents and Establishments of the 20 Largest Information Technology MSAs

Metropolitan Area	1998 Patents per 10,000 Employees	Total Patents 1998	Compound Growth in Patents, 1990–1998	1999 Total Establishments	Compound Growth in Establishments 1990–1999
Austin-San Marcos, TX	18.6	862	29.6%	1,023	11.6
San Jose, CA	10.6	2231	23.6%	4,195	8.0
San Francisco, CA	10.2	467	22.7%	2,161	8.5
Seattle-Bellevue-Everett, WA	9.2	386	23.3%	2,016	9.3
Oakland, CA	8.7	461	22.5%	2,407	11.5
Portland-Vancouver, OR-WA	8.6	375	21.4%	1,275	9.3
Phoenix-Mesa, AZ	8.2	389	18.4%	1,639	8.9
New York, NY	6.9	352	13.2%	4,274	8.5
Dallas, TX	6.0	547	15.2%	2,700	7.8
Raleigh-Durham-Chapel Hill, NC	5.5	239	25.1%	1,051	12.5
Minneapolis-St. Paul, MN-WI	5.5	275	9.6%	2,561	9.8
Boston MA-NH	4.3	745	8.1%	5,443	7.5
San Diego, CA	4.3	268	11.4%	2,016	9.3
Chicago, IL	4.2	461	10.8%	5,021	8.1
Los Angeles-Long Beach, CA	3.9	364	8.5%	5,071	5.7
Nassau-Suffolk, NY	3.5	125	7.5%	1,967	5.4
Philadelphia, PA-NJ	3.1	162	9.4%	2,636	6.7
Atlanta, GA	3.0	170	20.9%	3,069	12.2
Orange County, CA	2.9	230	12.7%	3,004	6.8
Washington, DC-MD-VA-WV	2.2	260	10.9%	4,449	9.1

Note: Broad Cluster Definition
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

THE NARROW CLUSTER VIEW

The narrow cluster view shows a significantly different picture of the Atlanta IT cluster composition. If we consider only the computer, electronic components, software, components, and communications services subclusters, Atlanta's cluster employment measure drops from 60,500 to 14,900. The region drops from 9th in broad cluster employment to 16th in narrow cluster jobs. The difference in employment is due primarily to the inclusion of computer and electronic wholesale operations and computer facilities and services in the broad definition. Together these subclusters account for close to 39,000 jobs.

However, the narrowly defined cluster actually grew faster than the broad cluster over the decade (9.1% to 8.9%) and supported higher average wages than did the broad cluster ($76,500 vs. $67,000 a year).

Wages in the narrow cluster rose at 6.6% a year, higher than the broad cluster's 5% growth. However, this level of narrow cluster wage growth trailed other leading IT regions, so Atlanta's position in the narrowly measured top 20 regions actually fell from third to fifth in terms of average wage paid.

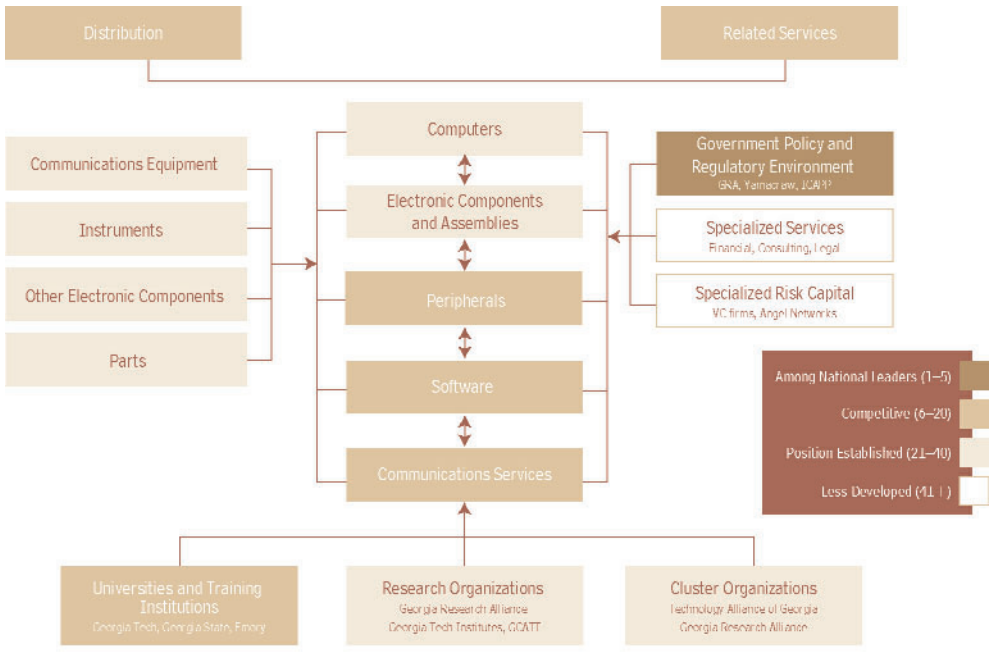
Investments/Venture Capital Funding. According to PriceWaterhouseCooper's Money Tree Database, Atlanta's information technology firms received $940 million in VC funding from 1995 through the third quarter of 2000. For the five-year period, VC funding represented 2.2% of the national total, equal to Atlanta's 2.2% share of national cluster employment. As for all clusters in the region, 2000 was by far the most successful year for Atlanta IT firms. Through the first three quarters of the year, Atlanta firms had attracted more than $186 million in venture capital or nearly 4% of the total national VC investment in information technology firms. Among the biggest recipients in 2000 were Employease, Derivion Corp, and Viewlocity, all software companies that received $20 million or more in funding.

Leading local venture capital firms like Noro-Moseley Partners, Alliance Technology Ventures, and Cordova Ventures have (until the recent downturn) been increasing their investments in local information technology companies and playing an important linking role for local business mentors and entrepreneurs. Entrepreneurs in the IT sector agreed that the level of venture support in Atlanta had improved dramatically over the decade, both in terms of quantity and quality. However, some still felt that exploring financing options outside of the region was a valuable step for start-ups. A minority, 36%, of the executives surveyed believed that regional access to risk capital of all sorts was difficult.[101]

Competitive Position of Atlanta's Information Technology Cluster

Exhibit 70 depicts the Atlanta information technology cluster. The boxes to the right (specialized services and government policy and regulations) and below (training institutions, research, and cluster organizations) are important components of the cluster, and their relative strength has been assessed using interview and survey data. The other boxes are the industry-based subclusters present in the region, and their strength is measured by their total employment relative to subclusters in other regions nationally.

Exhibit 70: Atlanta Information Technology Cluster



Source: Cluster Mapping Project at Institute for Strategy and Competitiveness, Harvard Business School, U.S. County Business Pattern Data; Regional Interviews

Subclusters that are among the five largest nationally appear in dark blue, "competitive" clusters that fall in the 6th through 20th spots nationally are green, and clusters with an "established position" in the top 40 appear in light blue.

The Atlanta information technology cluster has particular strengths in communications services, like communications infrastructure and ISP providers (Mindspring, BellSouth and Cox Cable), as well as software and web companies (Expedia, Web-MD, and Manhattan Associates), and computer systems integrators and e-commerce web designers like IBM and iXL. In addition, as mentioned previously, the Atlanta cluster has developed a focus on digitally enabled financial services. Companies like CheckFREE, TSYS and Equifax are considered national leaders in this area.

Exhibit 71 shows the competitive position of subclusters and industries in information technology in Atlanta. In terms of total employment, the largest subclusters are distribution, software, and computer-related services. The distribution subcluster includes wholesalers of computers, equipment, and software.

Exhibit 71: Competitive Position of Industries in Atlanta's Information Technology Cluster

Subcluster	SIC Code	Industry	National Industry Percent Share 1999	Total Employment 1999	CAGR of Total Employment 1990–1999
OVERALL CLUSTER			2.2	60521	8.9
Computers*	3571	Electronic computers	0.5	415	-13.1
Electronic Components and Assemblies*	3672	Printed circuit boards	3.0	2,265	12.5
	3674	Semiconductors and related devices	0.0	70	24.1
Peripherals*	3572	Computer storage devices	0.0	20	8.0
	3575	Computer terminals	18.5	770	-2.1
	3577	Computer peripheral equipment, n.e.c.	2.4	1,978	28.0
Software*	7372	Prepackaged software	2.6	8,055	12.7
Communications Services*	4820	Telegraph and other communications	4.0	28	-21.4
	4890	Communication services, n.e.c.	3.2	1,289	14.8
Distribution	5045	Computers, peripherals and software-wholesale	4.5	18,479	9.0
	5065	Electronic parts and equipment-wholesale	3.1	9,095	7.3
Other Electronic Components	3679	Electronic components, n.e.c.	0.8	1,626	9.1
Parts	3471	Plating and polishing	0.9	677	11.2
	3671	Electron tubes	0.4	70	0.0
	3676	Electronic resistors	0.1	10	
	3677	Electronic coils and transformers	0.4	68	
	3678	Electronic connectors	0.2	60	
	3695	Magnetic and optical recording media	3.5	570	-1.9
Related Services	7375	Information retrieval services	2.8	2,767	18.3
	7376	Computer facilities management	4.2	2,586	47.1
	7377	Computer rental and leasing	2.1	298	2.4
	7379	Computer related services, n.e.c.	2.6	5,660	16.1
Instruments	3826	Analytical instruments	1.0	337	17.3
	3827	Optical instruments and lenses	0.2	30	13.0
Communications Equipment	3661	Telephone and telegraph apparatus	0.8	853	-9.2
	3669	Communications equipment, n.e.c.	0.8	190	0.3
Research Organizations	8731	Commercial physical research	0.7	1,650	17.9
	8733	Noncommercial research organizations	0.7	605	-7.4

*Denotes a Narrow or "Core" subcluster
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Software includes non-custom software developers. Computer-related services include Internet service providers, contract computer programming, and computer repair services.

In terms of national share, distribution, communication services, and related computer services are strongest, ranging from 3.9 to 2.9 percent of total national employment in these industries.

Atlanta is relatively weak in manufacturing-intensive subclusters, including computer, electronic parts, and analytical instrument manufacturing.

Cluster Competitiveness and Innovative Capacity

Our analysis indicates that Atlanta provides a supportive competitive environment for information technology firms, particularly those involved in software, technology product distribution, and technology services. Local educational institutions provide a qualified workforce, and the region's quality of life has so far helped it attract skilled talent from other places. Government-sponsored educational programs like the Hope Scholarship and incubators like the Advanced Technology Development Center have helped foster cluster growth. So too has the continued work of a rich set of cluster institutions such as the Metro Atlanta Chamber of Commerce, the Technology Association of Georgia, and many cluster-focused publications and newsletters. While the Atlanta region did not start the decade with strong venture capital and specialized legal services for entrepreneurs, these services have developed in the region.

Specialized Infrastructure. Atlanta is among the most "wired" regions in the United States. Because of the 1996 Olympics and the strong corporate presence in the region, the fiber optic cable backbone is large and accessible for most of the commercial areas in the region. Multiple phone companies, Internet service providers, and cable companies provide high-speed connections to both commercial and residential users. IT firms looking for connections to Internet backbone networks will find Atlanta competitive with just about every other metro area in the U.S. (See Exhibit 83 for summary of survey results on cluster innovative capacity)

Specialized Research. GCATT, the Georgia Center for Advanced Telecommunications Technologies, is the most prominent research center focused on an information technology field. Opened in 1998 with Georgia Research Alliance funding, GCATT is a multi-story research facility utilized by Georgia Tech professors and private sector partners like Intel, Hitachi, and NCR. Georgia Tech is also home to the iXL Center for Electronic Commerce, which supports the following research areas: understanding online marketing and consumer behavior, strategic uses of business-to-business interorganizational systems, information security, IT-enabled entrepreneurship, business intelligence, and business models for Internet-based ventures.[102] In addition, Georgia Tech also supports campus-based research in computer science, electrical engineering, and high-tech manufacturing. In downtown Atlanta, Georgia State is home to the Center for Digital Commerce, the research arm of the recently created eCommerce Institute. (See next page for further details) In the private sector, IBM has located its Center for Ebusiness Innovation, its international hub for research in interactive media, in Atlanta.

Georgia State Center for Digital Commerce[103]

Initiated by a grant from the Georgia Research Alliance (GRA), the Center for Digital Commerce at Georgia State University is supported by a combination of public and private contributions, grants, and contracts. Support for an endowed chair in digital commerce was also provided by the GRA. Dr. Ravi Kalakota, a leading authority on electronic commerce, is the current Georgia Research Alliance Eminent Scholar in Digital Commerce chair holder based within the Center.

Center facilities include state-of-the-art equipment and space for administration, scholars and research assistants, seminar rooms, and research collaboration areas. The Center was specifically designed to promote cross-disciplinary collaboration among the many areas affected by e-commerce. The Center employs existing and emerging technologies to reach out to the community, the state, and beyond. The Center seeks to be a major resource for Georgia in attracting and retaining "industries of the mind."

A variety of research methods are employed within the Center to better understand and describe e-commerce. In addition to traditional research approaches, direct involvement in implementation projects, think tanks, and policy-formation activities provide both practical and theoretical perspectives on this rapidly emerging area. Already, several Ph.D. dissertations in this area are near completion, and many published papers have appeared in scholarly and practitioner journals. The Center has become the primary home for work in Legal XML and continues to contribute to work in electronic signatures and documents.

Despite these efforts, some information technology participants, particularly those not focused on communications technology, were not enthusiastic about the local research base. Sixty-five percent of survey respondents stated that specialized facilities for research are readily available to their firm, while 39% reported that these institutions frequently transfer knowledge. Across the five regions studied, 75% of private sector respondents believed research facilities were available, and 44% believed their local institutions did a good job in transferring technology.

Specialized Training and Talent Base. Georgia State, Emory, Georgia Tech, the Atlanta University Center institutions, and the region's community colleges offer a variety of general courses and specialized programs at the undergraduate, graduate, and continuing education levels. Georgia Tech is consistently ranked among the nation's top engineering schools and has been developing new courses around e-commerce at its Management School. Georgia State has developed an executive education program focused on e-commerce and is developing new courses based on the research efforts of the eCommerce Institute.

Despite the wide array of educational offerings, Atlanta institutions have not been able to keep up with the high demand for skilled technical workers and managers. Part of the demand was met by importing talent from other areas. In recent years, Atlanta has been able to attract more new college graduates than any other U.S. region.[104] There have also been international recruitment efforts undertaken by larger firms.

Still, through 2000, the constant refrain of Atlanta tech firms was that the lack of skilled labor was their greatest obstacle. Sixty-nine percent of information technology executives said the available pool of skilled human capital was one of the greatest threats to limiting their expansion in the region.[105]

Context for Firm Strategy and Rivalry. The Atlanta information technology cluster exhibits strong, but not overbearing competitive rivalry, a high rate of new firm formation, and a culture that increasingly encourages risk-taking. Fifty-eight percent of survey respondents described competition as "intense," and 56% said there was a large number of local competitors.[106] These rates were slightly above average across

all the clusters we surveyed. Still, many interviewees expressed their preference for the regional IT business environment to more established regions. To paraphrase one Atlanta IT executive, " there is competition here, but it's not brutal like in Silicon Valley. You don't have employees being swiped every day."[107]

New business creation in the cluster has increased rivalry, for employees and customers. The thousands of firm creations and expansions, particularly in the last half of the decade, have clearly changed the landscape for IT firms in Atlanta. Finally, interviewees consistently report that risk-taking is admired and rewarded, though some still felt that Atlanta financial leaders needed to be more willing to fund entrepreneurs who had failed in their first firm-building attempts. Entrepreneurs report that because of the increased numbers of VC firms and a deeper regional understanding of IT businesses, it would be easier to start a business now than it was five or ten years ago.

Sophistication of Regional Demand. Atlanta information technology executives expressed generally positive views about the level and sophistication of interaction with their local customer base. Many executives, however, expressed their belief that their products and services were actually national or international in scope and the nature of the business made local demand less critical. However, many also stated that the corporate base in Atlanta is an attractive market. Nearly 65% of respondents reported that their regional customers were sophisticated and demanding, but they did not feel that this demand provided them with a competitive advantage versus other regions. Forty-seven percent of the IT executives said that that their customers' feedback was a valuable input into new product development, the lowest among the three clusters studied in Atlanta and, one suspects, lower than one would receive in more established IT regions like Silicon Valley.[108]

Related and Supporting Industries. In the information technology field, many of the related and supporting industries are service providers like specialized training firms, legal services, financial services, and business consulting. While Atlanta has historically trailed other regions in the existence of technology-specific expertise in these fields, the breadth of these services has increased markedly over the past three to five years.

As Mike McQuarry of Earthlink explained, "There was nothing special about the business environment in Atlanta that compelled us to be here (in 1995). For the first three years, when we did not have many employees, any major metro area would have been fine. Now being based in Atlanta is a benefit. The talent pool here is strong, new IT companies mean there are easier partnership opportunities, and the level of supporting financial services has improved."[109]

Atlanta still does not match leading regions like Boston and Silicon Valley for the variety and number of their supporting service providers, but Atlanta firms are no longer forced to look outside the region to get venture capital, specialized consulting, or legal representation. Many major consulting firms, particularly the Big Five accounting/consulting firms and the top strategy firms, now have large e-commerce and information technology practices in the region. Said one Internet entrepreneur, "in Atlanta you have everything you need. It just may take a little longer."[110] However, many executives also believe that support services, particularly local venture capital and investment banking sectors, still have significant room to grow.

Government. The cluster has been the beneficiary of a variety of state government programs to foster investment in technology industries. These include the Georgia Research Alliance, which includes advanced telecommunications as one of its three areas of focus. The previously mentioned Georgia Center for Advanced Telecommunications Technologies is a tangible example of the investment the state, along with its private sector and university partners, has made in this cluster. Another state initiative that was implemented at the impetus of the private sector is the Advanced Technology Development Center

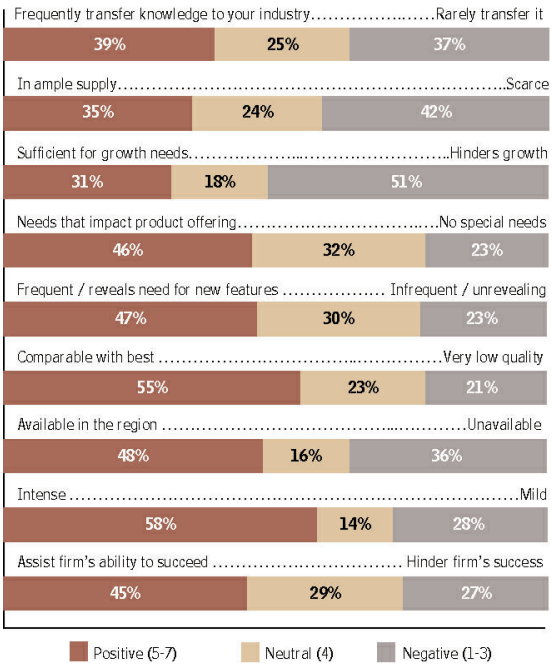
(ATDC), the technology business incubator housed on the campus of Georgia Tech. Founded in 1980, this incubator was one of the first in the South and has been expanding onto other university campuses throughout the state.

The ATDC focuses on education, firm-level mentoring and support, promoting technology transfer, and networking with financial providers. Its Faculty Research Commercialization Program, launched in 1992, is now an annual research competition available to faculty at all six GRA universities. Innovative ideas that could lead to commercializable products are funded by the program and often receive matching funds from private sector firms. Through June 30, 2000, 49 grants totaling more than $2.3 million had been provided, leading to the formation of 17 companies and $1 million in licensing agreements.[111] In 1996, the ATDC won the Randall M. Whaley Award given nationally to "outstanding business incubator of the year."

In addition to its investments in IT-related research and economic development, the State of Georgia, under Governors Barnes and Miller, has also been a leader in incorporating technology into its own systems, both to facilitate transactions and to promote the growth of regional information technology providers. The state has developed an Information Technology Policy Council to help guide state policies in IT, including the creation of a strategic plan for IT in the state. The General Assembly passed a digital signature law in 1999 and is one of few states to allow state tax forms to be filled out and submitted on line.

Information technology respondents were generally positive about the impact of state government regulations on their business success. Only 27% reported that state and regional regulations had a negative impact on their business.[112] However, IT executives have been among the most outspoken in their concerns about K-12 education, worsening traffic, and air quality situation.

Exhibit 72: Select Survey Results from the Atlanta Information Technology Cluster



Source: Clusters of Innovation Initiative Regional Survey™

Factor Inputs

- The institutions in your region that perform basic research . . .
- Qualified scientists and engineers in your region are . . .
- The available pool of skilled workers in your region is. . .

Demand Conditions

- Regional customers for your business' products / services have . . .
- Feedback from regional customers to improve your business' products / services is . . .

Related and Supporting Industries

- Regional specialized suppliers of your business' materials, components, machinery, and services are . . .
- Specialized suppliers of your business' materials, components, machinery, and services are mostly . . .

Rivalry

- Regional competition in your industry is . . .

Government

- State and regional government regulations affecting your business . .

Institutions for Collaboration. The leading institution for collaboration in the Atlanta region is the Technology Association of Georgia (TAG). TAG, formed in 1998, is the umbrella organization for a number of organizations in the Atlanta area that have existed for many years. The initial members include the Business and Technology Association, Southeast Software Association, and Women in Technology. Each of these organizations rose to a membership level of 2,000-3,000, which made them too big for volunteer management, but too small to afford a professional staff. They joined together, and now still exist as interest groups/chapters within TAG. In addition, at least two other chapters have been formed: the Technology Marketing Alliance and Interactive Technology Group. TAG has become the central networking organization within the Tech Community. (See text box for more information)

TECHNOLOGY ASSOCIATION OF GEORGIA[113]

TAG's Role

David Simmons, President of TAG, sees TAG's role in Atlanta as distinct from other regions' IT connective organizations because of its coordinating role. Other regions are characterized by having a fragmented group of connective organizations related to technology. He believes that Atlanta was "wide open" with fewer established interests in 1998, which allowed TAG to be implemented. Still, it took a lot of leadership from existing organizations to recognize that the coordination offered by the new structure would justify losing some independence.

TAG's broad mission is to support the growth of technology-related businesses in Georgia. As Simmons put it, he sees his job as looking for "holes to fill" or "weaknesses in the environment" and then taking actions to address them. One specific area that has been a focus since TAG's inception is linking entrepreneurs to capital.

TAG initiatives include:

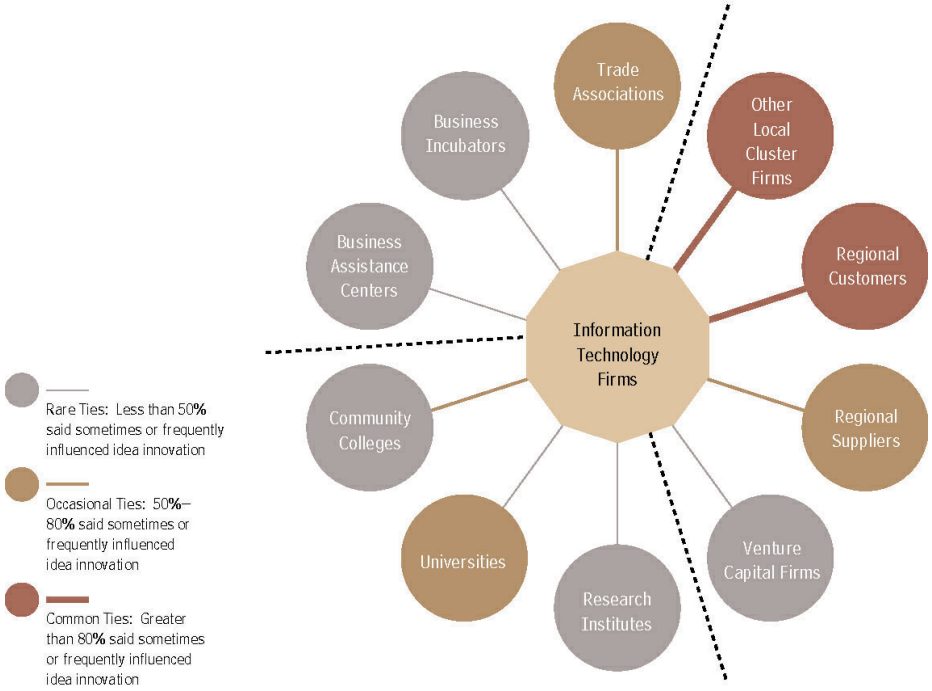
- Website to facilitate access to angel capital networks. Start-ups can post business plan descriptions and have them sent electronically to 30 affiliated investors.
- "Business Basics" course that is aimed at individuals with no business background who are thinking about starting a company.
- Georgia Software Development Conference so that local software developers do not have to go to Austin or New York for training.
- "Best and Brightest" e-awards to honor the industry's finest and draw regional public attention to the industry.
- Georgia Technology Forum, which is a venture capital Forum hosted in Atlanta.
- Essay Contest aimed at 6-8th graders, a partnership with IBM.
- High school web site building contest.

In addition to TAG, there are a number of other linking organizations that help diffuse knowledge through the cluster. TechLinks is an Atlanta-based magazine that focuses on Georgia and Atlanta technology issues. Nightlight is an event planning group that organizes regularly scheduled social/learning events for the technology cluster. Georgia Tech, Georgia State, and Emory all host seminars and conferences on technology issues that support business networking. For the public, and particularly for its companies, the ATDC plays an important role in connecting tech players.

Members of the ATDC rave about the helpfulness of the incubator. Said one CEO, "ATDC provides a great network. Fellow CEOs are often visionary and already ready to provide advice. It was easy to find mentors and industry experts to guide our development."[114] Mike McQuarry, one of the founders of Internet service provider Mindspring, believed that both ATDC and the community at large support partnership. "Collaboration is strong within the Atlanta IT cluster and the regions as a whole. Business leaders from all sectors embraced our success. We got a lot of positive community PR early on. The Atlanta Journal Constitution and TV stations were all supportive."[115]

This collaboration extends into new product and service development and commercialization. Information technology firms in Atlanta partner slightly more at the idea generation and development stage than at the commercialization stage of innovation. Exhibit 84 summarizes survey findings of interaction on idea generation. According to our survey, 30% of information technology firms frequently worked with their customers to design new products and services while another 55% said they sometimes did. More than 80% of IT firms at least sometimes work with other cluster firms in their innovation process.

Exhibit 73: Frequency of Interaction among Cluster Members on Idea Generation/Development



Source: Clusters of Innovation Initiative Regional Survey™

Despite the generally positive comments about institutions for collaboration and the real innovative programs developed by Atlanta institutions, a large minority of respondents is hoping for more from their associations. Fifty-one percent of our sample believed that relationships between firms and organizations in their cluster did little to assist their research and development efforts. Compared to the other clusters we studied in the region, information technology executives were highly split on the effectiveness of their

associations. Fifty-six percent of the respondents felt cluster organizations effectively promoted the interests of the cluster, while 36% did not. This cluster had both more positive and more negative respondents than any other group. This bifurcation stems in part from the fact that the cluster is "young" and many companies have not yet joined networking/industry associations.

Conclusion

Atlanta's information technology cluster has thrived over the last five years. Building from regional strength in software, communications, and financial services, entrepreneurs have established Atlanta as a broad-based IT region. Through state-led investments in research, education and infrastructure, an innovative technology business incubator, and the efforts multiple private sector entrepreneurs, Atlanta has developed a broad-based cluster. Seeing significant growth only over the past three years, Atlanta got a "late" start in the e-commerce and Internet area of this cluster, but is now home to a number of nationally recognized firms like WebMD, ISS, and Mindspring.

The entrepreneurs who started these firms have been critical in the development of the cluster, both through the success of their firms and through the personal and corporate investments they have made in other regional firms. While the recent tech sector downturn has been a painful blow to the cluster, the Atlanta region has created a critical mass of firms, talent, and institutions deep enough to withstand the hard times. Many companies have gone and will go under; however, the competitive platform of the cluster is strong enough to support the regeneration of new firms in better economic times. Indeed, the development of training programs, strong institutions of collaboration, overall community support of IT development, and government-sponsored research and university programs position Atlanta to rebound at a faster rate than other tech-dependent regions.

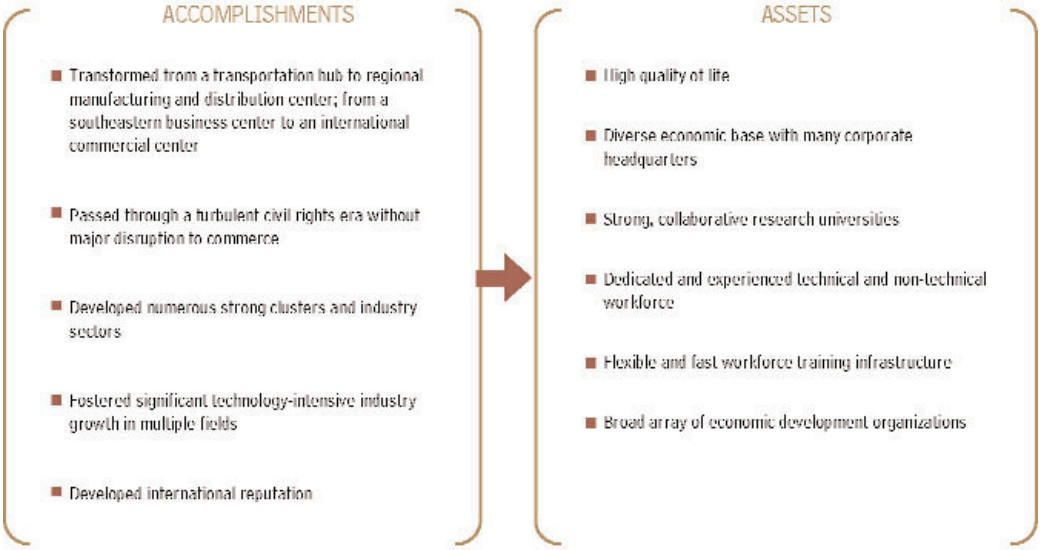
SUSTAINING COMPETITIVE ADVANTAGE: LESSONS, CHALLENGES, AND OPPORTUNITIES 5

Atlanta has accomplished much over its 160-year history. Once little more than a railroad crossing, the region has successfully transformed itself from a transport crossroads to a low-cost manufacturing area to a regional commercial hub, and finally to a truly global business center. This chapter examines Atlanta's experience and draws lessons from it for other regions. We discuss Atlanta's present challenges and suggest opportunities and new strategic directions to support future regional prosperity. In addition, we include an assessment of Columbus's competitive environment and offer suggestions for the region's further development.

ACCOMPLISHMENTS AND ASSETS

Today Atlanta has a strong competitive environment. Its quality of life and university base continue to attract skilled people from all over the United States and the world. Its wide economic base provides opportunities in multiple clusters to job seekers and provides the region security against sector-specific economic downturns. The State of Georgia has worked with private-sector leaders and associations to develop a number of initiatives that assist economic development through high-quality workforce development programs, educational assistance, business assistance, and cutting-edge research (see Exhibit 74).

Exhibit 74: Accomplishments and Assets



Economic performance in Atlanta over the last decade reflects this strong business environment. Population increased by more than one million people in the metro area. More than 600,000 new jobs were created, with business services, financial services, and transportation and logistics leading narrow cluster growth. Unemployment in 2000 stood at 2.8%, well below U.S. and Georgia averages. Wages increased at 4.5%, above the national average of 4%. Exports increased at 15.8%, nearly twice the U.S. average. Patents per capita increased at a 9.5% rate over the period.

LESSONS

Atlanta's regional economic growth has been shaped by a series of major influences that have persisted for many decades. The process by which the Atlanta community established its competitive strength provides lessons for other regions.

Build from Strength

Atlanta was born of the railroad. Atlanta's leaders recognized the transportations sector's importance and invested heavily to establish the region as the leading gateway to the Southeast. In addition, leaders consciously encouraged related economic sectors– including financial services and warehousing—to develop around the railroad. Community leaders later spearheaded a series of economic development efforts to move Atlanta from a transport center, to a regional manufacturing center, to a home for corporate headquarters. Modern-day Atlanta benefits from a wide economic base, and its traditional clusters like financial services, communications, and transportation and logistics continue to generate development in related fields like software and consulting services.

Drive for an International Position

Since the city's inception, Atlanta's leaders have sought to make the area a world player. From the 1895 International Cotton Exposition to the 1996 Olympics, the desire to internationalize has shaped major economic development programs as well as the business decisions of the region's executives. The internationalization process eventually seeded itself. As Atlanta attracted major U.S. corporate headquarters, their efforts to expand internationally helped the region attract foreign corporations.

Private Sector Innovation and Initiative

Going back to the successful effort to relocate the state capital from Milledgeville to Atlanta, most of the major economic development efforts undertaken in Atlanta have been conceived by private sector leaders who then were able to develop political and community support for them. Recent initiatives like the Yamacraw Project and the Olympics have followed this pattern.

In Atlanta, private sector-led economic development initiatives that mobilize government action have had a greater chance of long-term success than do government-generated initiatives. Having private sector leadership support up-front typically translates into a greater likelihood of government approval and faster project implementation.

State Government Activism

Georgia governors enjoy a strong set of executive powers. Since the 1970s, the state government, led by activist governors, has been a champion of technology and skill based development. Governors have spearheaded a succession of well-funded initiatives to strengthen the science and technology infrastructure in the Atlanta region. In addition, state funds for higher education institutions and for scholarships for Georgia students have helped increase the quality of post-secondary education. Due to Atlanta's high concentration of higher education institutions, it has gained a large share of state development investment.

Business-Government-University Collaboration

Particularly in recent years, university, public, and private sector leaders have worked together to create innovative collaborative programs like the ICAPP workforce training initiative and the Georgia Research Alliance. A common pattern has emerged in which private sector leaders convince a governor to support technology-based economic development programs that are then implemented through universities. The level of collaboration between and among the three sectors distinguishes Atlanta from many other regions. The willingness of competing public universities (Georgia and Georgia Tech) to join with private institutions in a research alliance is particularly notable.

Entrepreneurial Environment

Atlanta has developed cultural norms that are supportive of individuals who have big ideas. Thanks to a pro-business regulatory regime and an emerging record of venture success, entrepreneurs find Atlanta to be a fertile ground for major new projects and ideas. In the Southeast, Atlanta is viewed by most business people as the leading center for entrepreneurship. Young college graduates, in particular, are drawn to Atlanta over other major cities in the region.

Civic Pride

Atlantans, and particularly Atlantans in leadership positions, feel a strong compulsion to show their community in the most positive light. Many of Atlanta's most successful leaders have been superb marketers of the region, both internally and externally. The community has developed an attitude that it can do whatever it sets out to achieve. As one interviewee said, "Atlanta has self-fulfilling prosperity." The civic pride encompasses both natives and transplants. In Atlanta, there seems to be an expectation that once one has obtained political or commercial success, one should focus some time and effort on improving regional problems.

CHALLENGES

Atlanta has succeeded at buoyant growth, but faces the next challenge of translating this growth into broad-based prosperity relative to other advanced regions (see Exhibit 75). The population and commercial growth of Atlanta has created a variety of interrelated problems that the region must address to maintain its success, much less extend it. The transportation, water, and educational infrastructure are strained. Sprawling, unplanned regional growth has created traffic and land use challenges. A develop-

ing shortage of skilled human capital is a limitation to future growth. There is a growing gap between the cost of living and average salary levels. Despite strong success overall, there is still a significant issue around the unequal distribution of that wealth.

To resolve most of these issues, Atlanta will need to extend its strategy and make it truly regional solution—one that can encompass leaders from all governmental bodies in the metro area. To date, Atlanta's regional institutions and its business culture are not configured to produce coordinated solutions.

Exhibit 75: Atlanta's Challenges

Economic Performance

Increasing Gap between Wages and Cost of Living. The cost of living has been increasing faster than wage levels in Atlanta over the past decade. Average wages in 2000 were close to the national average, but the cost of basic living needs was approximately 20% greater than the national average. In 1993, the situation was reversed. Low wage earners in Atlanta fared better than their national counterparts at similar wages, as the regional cost of living was below the national average. For highly skilled workers, the gap between income and cost of living is smaller, though the gap has also increased from 1993 to 2000. Atlanta has traditionally relied on its low cost of living to differentiate the region from competitors. While it does still compare favorably to high-cost regions like Silicon Valley and Boston, the region is losing its "low-cost" advantage.

Ensuring Growth Reaches All Socio-economic Groups. The Institute for the Competitive Inner City data show that Atlanta has an inner city poverty rate of 28.7%, just slightly above average for major metro areas. U.S. Housing and Urban Development data shows poverty increasing slightly in the MSA as a whole and in the central city from 1989 to 1997, while U.S. poverty rates stayed stable. Atlanta, like

most U.S. regions, faces the challenge of ensuring that all of its residents have the opportunity to share in wealth creation. This challenge is not new, but has been exacerbated by the increasing distance between poor and rich over the last decade.

Infrastructure Strains

Traffic Congestion and Air Pollution. Rapid economic and population growth has put a strain on the region's physical infrastructure. The region is now so big that people who live in southern suburbs will actively try to avoid getting a job in the Georgia 400 corridor (the north) and vice versa. Traffic jams in Atlanta have earned national renown— and contribute to dangerous air pollution levels. Atlanta is now consistently among the nation's top five regions in air pollution. Its high levels of air pollution and the lack of an abatement plan led the federal government to suspend federal highway funds once. While the Georgia Regional Transportation Authority has developed an authorized plan to improve mass transit and reduce pollution, actually implementing the plan across such a large and diverse set of jurisdictions will be difficult.

Basic Service Provision for Water and Sewer. Infrastructure issues go beyond mass transit. Some areas of the region, notably the Buckhead area in North Atlanta, face restrictions in new commercial construction due to inadequate sewer capacity. The entire region faces a water shortage if growth continues at present levels and new sources of water cannot be secured. The Metro Chamber of Commerce, the state, and others have led the effort to develop a regional water authority. While this is an important accomplishment, the work is not yet complete.

Human Assets

Future Access to Skilled Labor. The rapid growth of the Atlanta economy over the past decade has led to the possibility that the region will be unable to replenish its pool of scientists, engineers, and skilled technicians. This critical input into innovation output is threatened by the decline in Atlanta's quality of life (harder to attract workers from outside the region) as well as the weakness in the K-12 education system (hard to develop the pool from within). Only 34% of the regional leaders we surveyed felt that the region had a pool of trained workers sufficient to meet growth needs.

Uneven K-12 Educational System. Young Atlantans can receive an excellent primary and secondary school education. However, many are not because of the uneven quality of K-12 education. Many executives interviewed expressed general concern about the quality of education and their personal views that they would only send their children to private schools. The future ability of Atlanta to support innovative firms in all sectors is partially dependent upon the region's ability to create a steady supply of capable high school graduates.

Innovation

Low Patenting Levels. Although Atlanta innovators have been increasing patenting output, in most industries, Atlanta still substantially trails leading regions in its innovation output. While patenting is not the only measure of innovation, patents are a tangible representation of new ideas and potential products, and the presence of patenting is correlated with other types of innovation. The more rapid development and commercialization of unique and proprietary technology will be necessary to provide a foundation for Atlanta's future prosperity.

Slow Commercialization of Innovation. Despite the development of numerous patented discoveries at local universities, the process of transferring technology from the academic institutions has been described as slow and cumbersome. Efforts are underway through the Georgia Board of Regents and the Georgia Research Alliance to improve the commercialization of research at universities in the state. However, the Atlanta region will have to mount an overall effort to improve commercialization.

Collaboration

Poor Regional Government Coordination. In addition to the City of Atlanta and dozens of other cities, the Metro Atlanta area has 20 counties, each with its own government leadership. While there is a regional body, the Atlanta Regional Commission, county governments still exert great independence in decisions around construction, zoning, and taxation. The traffic congestion and air pollution problems have arisen in part because of the lack of coordinated regional action. The solutions to these problems, along with the work to improve the overall infrastructure, will absolutely require coordinated regional efforts.

Uneven Cluster Development. Atlanta has a strong regional collaborative institution, the Metro Chamber, and a number of other regional institutions of collaboration. However, cluster development thinking and cluster-specific institutions for collaboration are lacking. In both the transportation and logistics and financial services clusters, for example, some Atlanta executives believed their institutions could play a more proactive role in spurring collaboration and marketing the cluster.

THE NEED FOR NEW DIRECTIONS

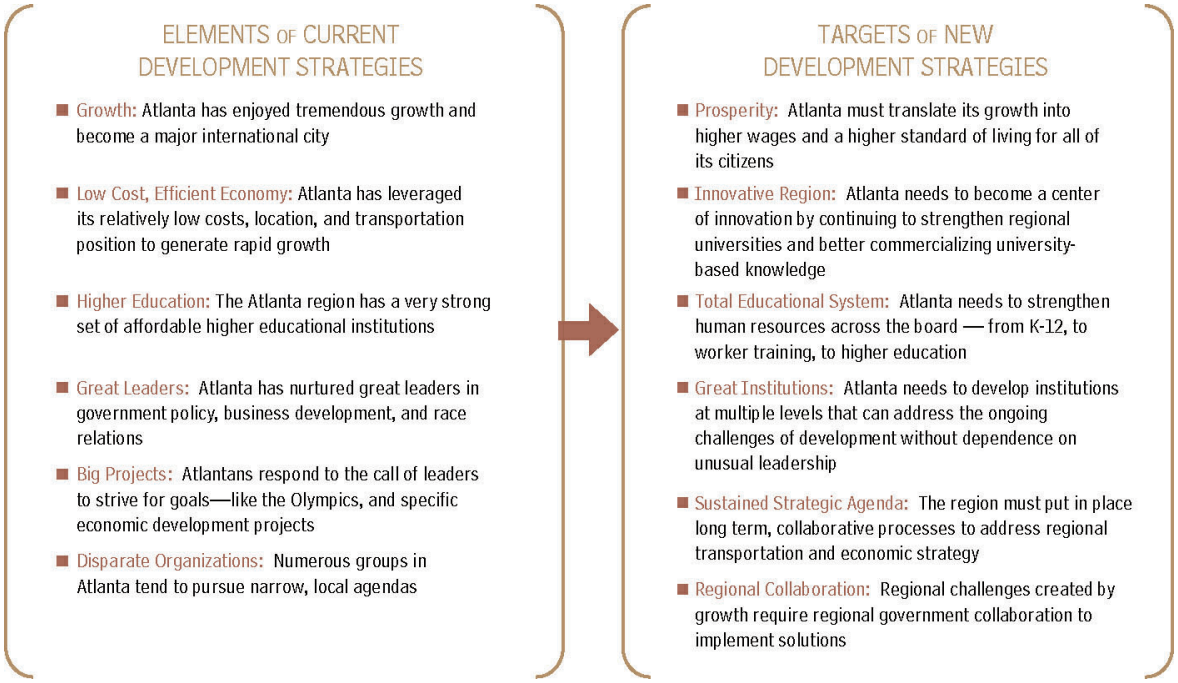
Atlanta has become a highly competitive region, but its very success has created a host of challenges to future prosperity and created the need to move beyond traditional strategies. To remain competitive and address the issues required to maintain an improving regional standard of living, the focus of economic development efforts should be modified and broadened. New strategic directions are needed (see Exhibit 87).

From Growth to Prosperity. Atlanta has enjoyed tremendous economic growth over the past century, and particularly over the last decade, creating more jobs than any other major metro area in America. However, its growth has also led to strains– pollution, traffic, and a rising cost of living, to name a few, that pose threats to the prosperity of its residents. Furthermore, all residents have not shared the wealth created over the last decade. The average wage paid in Atlanta has not kept pace with increases in the cost of living. Poverty is still a very real aspect of the Atlanta region that must be addressed.

From Low Cost, Efficient Economy to Innovative Region. Historically, Atlanta has leveraged its relatively low costs, privileged location, and attractive climate to generate economic development. This traditional approach is losing its relevance. With regional costs increasing and the challenge of success increasingly tied to productivity growth, Atlanta needs to become a center of innovation by continuing to strengthen regional universities, better commercializing university-based knowledge, and attracting private sector research efforts. Accomplishing this shift will require a change in the traditional economic development mindset of many regional leaders.

From Higher Education to Total Educational System. Atlanta has a strong set of higher educational institutions, but its secondary school system needs improvement. Too many of Atlanta's youth, the building blocks of future generations of business leaders, scientists, and professors, are not getting the edu-

Exhibit 76: Atlanta's Economic Vision: New Directions



cation they need. The challenge is to maintain high standards in higher education while preparing more local young people to meet those standards.

From Great Leaders to Great Institutions. Atlanta has prospered thanks to the direction provided by great leaders. Ivan Allen led the move to develop a southeastern hub for business. Martin Luther King Jr. led Atlanta through the tumultuous desegregation process. Billy Payne brought home the Olympics. In the process of attaining these accomplishments, these leaders mobilized large numbers of people to support their cause. However, their legacy typically did not lead to the institutionalization of these groups into ongoing organizations. The challenge for Atlanta is to develop institutions that can address the ongoing challenges of development without relying upon the unusual gifts of leaders, who will have a difficult time driving progress as the size and diversity of the region grows.

From Major Projects to a Sustained Strategic Agenda. Atlanta has a history of successful projects. These range from building Hartsfield Airport to hosting the Olympics. The local culture and government policies that support business and social entrepreneurship have helped Atlanta grow. However, this explosive and largely unplanned growth has led to serious challenges. Addressing these issues, particularly around infrastructure, will require more than a one-time effort. It will require the development of long term, collaborative processes to address regional transportation, environmental, and other needs.

From Disparate Organizations to Regional Collaboration. Individual government and civic institutions in Atlanta have attempted to craft responses to social and economic problems in the region. However, concerted regional efforts are rare because of the strained relationships between local and regional government institutions. Increased local government collaboration and sustained business involvement are necessary to address long-term infrastructure and educational issues.

OPPORTUNITIES

Atlanta leaders should consider a new economic development vision. By doing so, the region will be better able to take advantage of the opportunities that exist for increased prosperity. By increasing innovative capacity, assisting both established and emerging clusters, and expanding the geographic scope of development efforts, the region stands to ensure a prosperous future (see Exhibit 77).

Exhibit 77: Atlanta's Opportunities

Increase Innovative Capacity

Unlock the Commercial Potential in Universities. While the Georgia Research Alliance has done an excellent job in supporting innovative research and the development of strong academic programs, the patenting output of its member institutions has not kept pace with national competitors. There is also a need for increased emphasis on the commercialization of the innovations that do emanate from regional universities. Members of the Atlanta business community believe that technology transfer offices at regional universities could do a significantly better job of connecting with both entrepreneurial and established companies in the region. Efforts are underway to improve the communication and processes of tech transfer institutions. They should be fully supported.

Attract Additional Non-university Research Institutions. With its numerous colleges and universities, expertise in many fields of study, and attractive quality of life, Atlanta is a good place for private and non-profit research centers to locate. Such research centers are not only valuable in their own right as centers of innovation and training, but also potentially help address two of Atlanta 's critical needs. First, they can become leading generators of patents and innovation output – helping to strengthen the regional culture of patenting and innovation. Second, they can help bridge the gap between basic research in the universities and commercial needs of industry, perhaps becoming models of technology transfer.

Focus on Technology in Addressing Environmental, Traffic Management, and Logistics Issues — Key Areas that Challenge Quality of Life. Atlanta faces some of the most serious air pollution and traffic problems in the country. It is also home to top-notch engineering research, a transportation and logistics research center, and leading firms in key technology fields. However, Atlanta is not known for its innovation in addressing environmental challenges. It should be. Atlanta has the opportunity to address the challenges of pollution and traffic in the next big community project. The next Olympian effort should be to preserve the quality of life that has been so critical to the success of Atlanta – both by focusing research efforts on developing new technology solutions and by challenging community residents to adopt less polluting lifestyles.

Upgrade and Leverage Existing Clusters

Develop Stronger University Ties to Emerging and Established Clusters. Business and university leaders work to link assets within local universities to companies in emerging and established clusters. Although universities can be a source for the creation of new clusters, this takes many years and it is difficult to predict what those clusters will be. More immediate benefits can be realized by building on areas of existing strengths, such as identifiable emerging and established sectors like communications, consumer goods, and tourism/entertainment.

Identify and Pursue Additional Opportunities at the Intersection of Clusters. Atlanta has already seen success where strong clusters come together, notably financial services and information technology. Some firms have also been innovating in the field of software and new communications technologies for the transportation and logistics industry. Given the large base of firms and the Logistics Institute, this area seems ripe for further development. Opportunities may exist in defense-related information technology and innovative food processing, particularly given the nation's new military requirements. As a region, Atlanta can do more to foster cross-cluster collaboration by hosting networking events designed to foster this kind of interaction.

Expand Geographic Focus

Continue to Develop International Ties, with Special Focus on Opportunities in Latin America. Atlanta has a long history of seeking international commercial relationships and has enjoyed impressive success in attracting both European and Asian firms to locate headquarters in the region. Cargo shipments to and from those regions through Hartsfield have also been increasing. Latin America represents a natural opportunity for international ties, and some Atlanta leaders have recognized it as the next frontier for the region. Latin America foreign commerce is expected to grown by 3 to 5% a year over the next decade and Atlanta is well positioned to take advantage of it. The recent expansion of the cold storage facilities at Hartsfield and Delta's expanded flights to Latin cities are important enablers for the region to attract traditional Latin American products like fruits and flowers. However, to attract additional Latin businesses, regional leaders should invest in efforts by the Metro Chamber to enhance Atlanta's stature among Latin business decision makers who traditionally use Miami and Houston as key commercial hubs.

KEY ASSETS, CHALLENGES AND OPPORTUNITIES IN COLUMBUS

The Columbus region has outperformed the national economy over the past decade in job creation and wage growth. Led by major employers like Synovus, American Family Life Assurance Company (AFLAC), and Columbus Regional Healthcare, the economy was able to produce close to 20,000 new jobs over the period.

However, despite the increases over the period, average wages for Columbus in 1999 were only $25,430, or 79% of the national average. This relatively low wage level and the draw of larger communities like Atlanta have made it hard for Columbus to retain its talent pool, despite an attractive climate and relaxed quality of life.

Columbus has benefited greatly from the headquarters of two international financial service companies: Synovus, a financial service holding company which owns a world-leading electronic payment processor, and AFLAC, a leading supplemental insurance company. These two companies employ close to 10% of the total regional private sector workforce and are major contributors to civic and economic development efforts. Along with Fort Benning, a major Army base, these organizations anchor the regional economy.

Key Assets

- Strong set of big financial service companies that anchor the economy – Synovus, AFLAC, Blue-Cross Blue Shield—and contribute to civic development
- Presence of Ft. Benning that drives retail growth and provides skilled workforce
- Presence of large labor pool with experience in computer programming
- Responsive local government that consolidates city/Muskogee County
- A proactive institution for collaboration (Columbus Chamber of Commerce)
- Attractive quality of life

Challenges

- Developing greater recognition for Columbus as a business location nationally and internationally
- Moving from a town with some big companies to a region with strong industry clusters
- Leveraging links to Atlanta without losing local identity

Opportunities

- Develop an explicit economic development strategy to build the region's financial services cluster around existing anchor firms
- Expand efforts to support entrepreneurial start-ups in the region; promote location of spin-outs of anchor firms in the region

While Synovus and AFLAC have been individually successful, their success has not yet led to the development of a broad financial services cluster in Columbus with its own national reputation. A few financial service suppliers and complementary businesses, like credit card issuing institutions, have been established in the region, but their numbers are limited. Synovus employees have generated a few spin-offs, but new jobs created for the Columbus region have been modest.

There is an opportunity for the companies and community to make a concerted effort to develop a technology-intensive financial services cluster. To accomplish this will likely require an explicit economic development plan to upgrade local institutions and foster both new start-ups and spin-offs of existing companies.

Columbus is well structured to address its economic development challenges. Its unified city-county government is a model for regional government collaboration within the state. The government has a strong relationship with the Chamber of Commerce and other local civic and educational institutions. These groups have a history of working closely together on past economic development initiatives. What is needed is a new strategy to take the region to the next level.

End Notes

1. "From Henry Grady to the Georgia Research Alliance: A Case Study of Science-Based Development in Georgia." Richard Combs and William Todd, unpublished paper, 1996.
2. Michael E. Porter, Hirotaka Takeuchi, Mariko Sakakibara, *Can Japan Compete?* New York: Perseus Books (2000).
3. See Michael E. Porter, *The Competitive Advantage of Nations*, New York: The Free Press (1990).
4. For an expanded treatment, see Chapter 7 in Michael E. Porter, *On Competition*, New York, The Free Press (1998).
5. Michael E. Porter, Scott Stern, Council on Competitiveness, *The New Challenge to America's Prosperity: Findings from the Innovation Index*, Washington, D.C.: 1999.
6. In the case of the Atlanta, the region is defined as the Atlanta MSA which includes 20 counties. A special focus on the Columbus MSA (three counties) was also incorporated.
7. By traded, we mean that the location of the firms in these clusters is not driven by the need to be near a specific natural resource, or by population concentration. Instead, these industries are located in a specific area for some reason related to the region's innovative capacity.
8. The 1992 Input-Output Accounts measure the share of economic value traded between industries.
9. Gary M. Pomerantz, *Where Peachtree Meets Sweet Auburn: A Saga of Race and Family*. (Penguin Books: New York; 1997) p. 40.
10. Pomerantz, p. 53.
11. Richard S. Combs and William J. Todd, "From Henry Grady to the Georgia Research Alliance: A Case Study of Science Based Development in Georgia," Unpublished paper, 1999.
12. Pomerantz, p. 59.
13. Pomerantz, p. 60.
14. Pomerantz, p. 90.
15. Pomerantz, p. 91.
16. Combs and Todd, p. 4.
17. Pomerantz, p. 340.
18. Woodruff reportedly called Mayor Allen after the assassination to offer advice and a donation. He told Allen, " The minute they bring King's body back tomorrow-between then and the time of the funeral-Atlanta, Georgia is going to be the center of the Universe. I want you to do whatever is right and necessary and whatever the city can't pay for will be taken care of. Just do it right." Pomerantz, p. 356.
19. Optical networks, digital signaling, and broadband communications are the three focus sectors for Yamacraw.
20. This number includes government and farm labor that is not included in the Cluster Mapping Project data.
21. US Department of Labor, Bureau of Labor Statistics.
22. All of these indexes are employment weighted.

23. The clusters are business services, construction services, distribution services, education and knowledge creation, and processed food.
24. This paragraph relies on data from the Baker Thompson and Associates, Economic Reference Reports, 1993 to 2000.
25. This paragraph relies on data from the Baker Thompson and Associates, Economic Reference Reports, 1993 to 2000.
26. National Commission on Entrepreneurship, "High Growth Companies: Mapping America's Entrepreneurial Landscape." July 2001. p. 13. This report considers the Atlanta Labor Market Area, an area that is defined close to, but not in exactly the same way as the Atlanta Metropolitan Statistical Area. Atlanta is fifth in the nation among all Labor Market Areas with more than 1 million in population.
27. Jobs in traded industries pay about $13,000 more per year than jobs in non-traded industries.
28. U.S. Census Bureau, REIS Database; Industry Week Annual Manufacturing Survey, www.industryweek.com
29. Industry Week Annual Manufacturing Survey, www.industryweek.com
30. Due to lack of data, the tobacco cluster is not included.
31. Cluster Mapping Project Data; Narrow cluster definition used for this analysis
32. Industries appear in more than one cluster (e.g., noncommercial research institutions are in both biotech/pharma and communications). One consequence of this is that employment totals of several clusters double-counts some workers. To solve this problem, the CMP identified narrow or "core" industries. All industries are core industries in one cluster, and one cluster only. In addition, many industries are included in the broad definitions of multiple clusters. For example, noncommercial research institutions is a core industry in the education and knowledge creation cluster, and is a broad industry included in several other clusters, including biotech/pharma and communications.
33. 193,400 jobs out of the 218,600 total created.
34. Airport Statistics www.atlanta-airport.com
35. Airport Statistics www.atlanta-airport.com
36. "We used to laugh at Los Angeles. Now we are Los Angeles." Vince Taylor, manager of Sweetwater State Park in Lithia Springs, quoted in Jane Gross, "Urban Sprawl Threatens Solitude and Fragile Lands of Georgia's State Parks," New York Times, September 5, 2000. www.nytimes.com
37. Texas Transportation Institute, Texas A&M University, 1999 Annual Mobility Report.
38. Atlanta Communications Executive, interview, December 6, 2000
39. Real Estate Executive, Interview, December 7, 2000.
40. "City address, country sewage", Kevin Griffs, *Creative Loafing*, December 9, 2000. p.23
41. USA TODAY, Monday August 20, 2001 p. 2a "Get up, wash, check air quality…"
42. "GRTA is Poised to Fulfill Barnes' Original Vision for It," Unsigned Editorial, *Atlanta Journal and Constitution*, June 6, 2001, p. 12A.
43. National Science Foundation, Web Caspar Database
44. www.usnews.com/usnews/edu January 3, 2002.
45. Emory University and Georgia Tech University Data
46. Clusters of Innovation Initiative Regional Survey™
47. NSF WebCASPAR Database System.
48. Clusters of Innovation Initiative Regional Survey™.
49. Atlanta Journal and Constitution. February 1, 2001 p. D4 www.southern.org
50. "The TR University Research Scorecard," Technology Review Magazine, September 2001, www.technologyreview.com.. Data are based on submission to the Association of University Technology Managers and CHI Research. Technological strength was calculated by measuring the number of patents awarded to an institution and the citation of previous year's patents.

51. "The TR University Research Scorecard," Technology Review Magazine, September 2001, www.technologyreview.com.
52. Georgia Department of Education and National Center for Educational Statistics.
53. Clusters of Innovation Initiative Regional Survey™.
54. "Money Tight for Metro Schools; Reforms, Explosive Growth Blamed," Andrea Jones, James Salazar, *Atlanta Journal and Constitution*, May 29, 2001 p.1A. Many school districts complain that the increased funding has not been sufficient to pay for the additional teachers necessary to meet the student-teacher requirements.
55. Interview with Information Technology Executive, March 30, 2000.
56. Richard Combs and William Todd, "From Henry Grady to the Georgia Research Alliance: A Case Study of Science Based Development in Georgia," in *Science Based Economic Development* (New York: New York Academy of Sciences, 1996) , 59-77.
57. Interview, March 3, 2000.
58. W. Henry Lambright "Building State Science: Georgia," unpublished draft, 1998.
59. Interview with Mike Cassidy, Vice President, Georgia Research Alliance, February 2000.
60. Interview with Mike Cassidy, Vice President, Georgia Research Alliance, February 2000.
61. Jane Gross, "Urban Sprawl Threatens the Solitude and Fragile Lands of Georgia's State Parks, " *New York Times*, September 5, 2000, web edition.
62. The state of Georgia has 159 counties, a very large number for the medium-sized state. The counties were originally set up so that every citizen would be within one day's mule ride to the county seat.
63. Real Estate Executive, interview, December 7, 2000.
64. Corporate Lawyer, interview.
65. Business Executive, interview, April 12, 2000.
66. Electronic Commerce and the State of Georgia: Analyses and Recommendations; Department of Computer Information Systems and the Electronic Commerce Institute, Georgia State University, October 1999. p. 77
67. Community Leader, interview, May 23, 2001.
68. IT Entrepreneur, interview, March 6, 2000.
69. Business Executive, interview, May 23, 2001.
70. Business Executive, interview, February 23, 2000.
71. Community Leader, interview, May 23, 2001.
72. Clusters of Innovation Initiative Regional Survey™.
73. Cluster Mapping Project Institute for Strategy and Competitiveness, Harvard Business School.
74. Location quotient is a widespread measure of concentration. The formula is a region's share of employment in a cluster, divided by that region's share of total national employment.
75. Note that TSYS is actually based in Columbus, but has a research and development arm in Atlanta.
76. U.S. Bureau of Labor Statistics, Occupational Employee Statistics, 1998.
77. Clusters of Innovation Initiative Regional Survey™.
78. Clusters of Innovation Initiative Regional Survey™.
79. Clusters of Innovation Initiative Regional Survey™.
80. Clusters of Innovation Initiative Regional Survey™.
81. Rob Chamber, "TODAY'S TOPIC: FINANCIAL SERVICES; Georgia's changing banking climate," *Atlanta Journal and Constitution*, 3 October 1997. p. 2B. Georgia did not change the law limiting branch openings until 1998.
82. Clusters of Innovation Initiative Regional Survey™.

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84. "Celebrating One Hundred Fifty Years of Atlanta Business," *Atlanta Business Chronicle*. 1987, p. 20.
85. Celebrating One Hundred Fifty Years of Atlanta Business," *Atlanta Business Chronicle*. 1987, p. 22.
86. "Atlanta Smart City.Com, Transportation," Metro Atlanta Chamber of Commerce, 2000, p.10.
87. PWC Money Tree Database. The closest measure that PWC provides for transportation and logistics is for retail and distribution. This figure does not reflect the full breadth of the cluster.
88. Clusters of Innovation Initiative Regional Survey™.
89. Logistics Institute website, www.tli.gatech.edu/.indpart October 22, 2001.
90. Clusters of Innovation Initiative Regional Survey™.
91. Lawyer, interview, March 2, 2000.
92. Clusters of Innovation Initiative Regional Survey™.
93. Clusters of Innovation Initiative Regional Survey™.
94. Clusters of Innovation Initiative Regional Survey™.
95. Clusters of Innovation Initiative Regional Survey™.
96. Clusters of Innovation Initiative Regional Survey™.
97. Clusters of Innovation Initiative Regional Survey™.
98. Clusters of Innovation Initiative Regional Survey™.
99. Trucking and transportaion broker, interview, December 7, 2000.
100. Logistics software executive, interview, April 14, 2000.
101. Clusters of Innovation Initiative Regional Survey™.
102. Electronic Commerce and the State of Georgia: Analyses and Recommendations; Department of Computer Information Systems and the Electronic Commerce Institute, Georgia State University, October 1999. p. 76.
103. Excerpted from Electronic Commerce and the State of Georgia: Analyses and Recommendations; Department of Computer Information Systems and the Electronic Commerce Institute Georgia State University, October 1999. p. 73.
104. Headquarters Atlanta Metro Atlanta Chamber of Commerce, April 2001, p.7.
105. Clusters of Innovation Initiative Regional Survey™.
106. Clusters of Innovation Initiative Regional Survey™.
107. Business Executive, interview, March 29, 2000.
108. Clusters of Innovation Initiative Regional Survey™.
109. Interview, March 30, 2000.
110. Interview, March 3, 2000.
111. ATDC, *Accelerating Technology Ventures Brochure*, 2000.
112. Clusters of Innovation Initiative Regional Survey™.
113. Information drawn primarily from interview with Business Executive, February 22, 2000.
114. Web Entrepreneur, interview, March 3, 2000.
115. Interview, March 30, 2000.

appendix 1
DEFINITION of MEASUREMENTS

OUTPUT MEASURES

Measure	Definition	Calculation	Source
Employment	Number of persons employed per MSA/cluster	Sum of employment in all counties constituting the Metropolitan Statistical Area (MSA)	County Business Pattern Data on 4-digit Standard Industrial Classification (SIC) industries per county
Wages	Payroll of region/cluster per employed in MSA/cluster	Total payroll dived by total employment per region/cluster; calculated as employment weighted average of wages per county (for region) or industry (for cluster)	County Business Pattern Data on 4-digit SIC industries per county
Exports	Value of manufacturing and non-manufacturing commodity exports per industry and MSA	Direct use of data.	U.S. Department of Commerce's International Trade Administration data on the two-digit SIC level

INNOVATION MEASURES

Measure	Definition	Calculation	Source
Patents	Number of patents registered per MSA/cluster	Direct use of data for MSAs. For clusters, we need to distribute the aggregate number of regional patents to individual industries.	U.S. Commerce Department data on patents per MSA
Venture Capital Investments	Value of Venture Capital Investment per MSA/cluster	Direct use of data	PriceWaterhouse-Cooper's MoneyTree Database
Fast Growth Firms	Number of companies on Inc. 500 list	Direct use of data Inc. Magazine lists companies by sales growth.	Inc. Magazine Top 500 list of high-growth companies
Initial Public Offerings	Number of IPOs per MSA	Direct use of data	Hoover's IPO Central.com

COMMON BUSINESS ENVIRONMENT MEASURES

Measure	Definition	Calculation	Source
Basic research	Federal funds for research universities per MSA	Direct use of data	National Science Foundation WebCASPAR Database System
Skills of work-force	Number of employees per skill and MSA	Direct use of data: Number of scientists / engineers, technicians in scientific and engineering fields, managers and professionals, and science and technology graduates in the regional workforce	U.S. Bureau of Labor Statistics, Occupational Employment Statistics
Education	Expenditure and performance per student and MSA	Direct use of data: High school graduation rates, student/teach ratios, average expenditures per student, and SAT scores	Georgia Department of Education, National Center for Education Statistics
Physical infrastructure	Transportation System, Communications System, Utilities	Direct use of data	Clusters of Innovation Initiative Regional Survey™ Data
Supply of Risk Capital	Size of local venture capital industry	Direct use of data: Number of local venture capital firms, and total funds management by local venture capital firms	Alternative Assets
Quality of Life		Direct use of data: Cost of housing, and level of traffic congestion	American Chamber of Commerce Research Association, Clusters of Innovation Initiative Regional Survey™ Data

CLUSTER-SPECIFIC BUSINESS ENVIRONMENT MEASURES

Measure	Calculation	Source
Specialized research centers	Direct use of average questionnaire response: How available are local research centers to use by private firms, and how frequently do they transfer technology and knowledge to the private sector?	Clusters of Innovation Initiative Regional Survey,™ and interviews
Specialized talent base	Direct use of average questionnaire response: Is there a sufficient number of qualified scientists, researchers, technicians, and business managers to sustain and grow companies in the region?	Clusters of Innovation Initiative Regional Survey,™ and interviews
Specialized training	Direct use of average questionnaire response: Do local institutions supply a sufficient number of qualified scientists, researchers, technicians, and business managers, and will this improve or worsen in the future?	Clusters of Innovation Initiative Regional Survey,™ and interviews
Sophistication of demand	Direct use of average questionnaire response: Are local customers sophisticated in their demand for new and better products, and do companies receive regular feedback from these customers?	Clusters of Innovation Initiative Regional Survey,™ and interviews
Intensity of rivalry	Direct use of average questionnaire response: How many local rivals are there in your cluster, and would you characterize competition as more intense or more mild?	Clusters of Innovation Initiative Regional Survey,™ and interviews
Degree of cooperation	Direct use of average questionnaire response: Do firms share knowledge with each other, and do they consistently contribute to cluster-wide projects and initiatives?	Clusters of Innovation Initiative Regional Survey,™ and interviews
Related and supporting	Direct use of average questionnaire response: What is the quality of local suppliers and supporting industries, how frequently do firms source from outside the region, and how much feedback to related industries give on improving products and processes?	Clusters of Innovation Initiative Regional Survey,™ and interviews

appendix 2

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

To generate primary quantitative and qualitative data, we have conducted a regional survey using the Clusters of Innovation Initiative Regional Survey™ tool and in-depth interviews in the region. The survey (available on the Council on Competitiveness' website at www.compete.org) was completed by 202 executives at companies and institutions throughout the region. Of the total, 142 were from private sector firms and 60 were from regional institutions of collaboration and other non-cluster organizations (e.g.,venture capital firms, banks). Our team conducted in-depth interviews with 43 individuals in the Atlanta-Columbus region. Of these, 25 were with business executives in the transportation and logistics, financial services, or information technology clusters, while 18 were representatives of academic, government, or institutions for collaboration.

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	High	Neutral	Low
The cost of doing business (specifically, the cost of real estate, wages and salaries, and utilities) is…	**1** *High relative to other regions* **7** *Low relative to other regions*	200	4.5	55.0%	21.0%	24.0%
The overall quality of transportation (e.g., roads, air transport, railroads and ports) is…	**1** *Very poor relative to other regions* **7** *Very good relative to other regions*	202	4.7	59.9%	10.9%	29.2%
Specialized facilities for research (e.g., science laboratories, university research institutions and technical libraries) are…	**1** *Limited* **7** *Readily available*	201	5.2	72.6%	14.9%	12.4%
The institutions in your region that perform basic research…	**1** *Rarely transfer knowledge to your industry* **7** *Frequently transfer knowledge to your industry*	202	4.3	49.0%	22.8%	28.2%
The communications infrastructure (including internet access) in your region…	**1** *Fails to satisfy your business needs* **7** *Fully satisfies your business needs*	198	5.8	86.9%	7.1%	6.1%
Qualified scientists and engineers in your region are…	**1** *Scarce* **7** *In ample supply*	195	4.9	52.3%	22.1%	25.6%
The available pool of skilled workers in your region…	**1** *Is too small and hinders your growth* **7** *Is sufficient to meet your growth needs*	197	3.8	34.0%	19.8%	46.2%
The overall quality of the K-12 education system is…	**1** *Very poor* **7** *Very high*	116	3.95	38.8%	25.0%	36.2%

High = 5,6,7 Neutral = 4 Low = 1,2,3

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	High	Neutral	Low
Advanced educational programs (e.g., vocational schools, colleges and /or universities)…	*1 Provide your business with low quality employees* *7 Provide your business with high quality employees*	198	5.2	76.8%	13.1%	10.1%
Training for computer and internet technology is…	**1** *Not available to all regional residents* **7** *Available to all regional residents*	195	5.1	71.8%	15.4%	12.8%
Regional access to risk capital (e.g. venture funds and private equity investments) is…	**1** *Difficult* **7** *Easy*	198	4.8	50.5%	22.7%	26.8%
The overall quality of life (e.g., climate, cultural and recreational opportunities) in the region)…	**1** *Makes recruitment and retention of employees difficult* **7** *Makes recruitment and retention of employees easy*	202	5.6	87.1%	7.4%	5.4%
The cost of living in your region…	**1** *Makes recruitment and retention of employees difficult* **7** *Makes recruitment and retention of employees easy*	202	5.1	76.2%	11.9%	11.9%
Recent economic growth in your region has	**1** *Primarily benefite d those with high wealth or high skills* **7** *Helped everyone*	200	5.2	78.5%	6.0%	15.5%
Regional customers for your business's products/services are…	**1** *Unsophisticated and undemanding* **7** *Sophisticated and demanding*	149	5.0	69.1%	18.8%	12.1%
Regional customers for your business' products/services have…	**1** *No special needs that impact your product offering* **7** *Special needs that impact your product offering*	142	4.8	59.9%	25.4%	14.8%

High = 5,6,7 Neutral = 4 Low = 1,2,3

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	High	Neutral	Low
Feedback from regional customers to improve your business's products/services is…	**1** *Infrequent and does not reveal the need for new features or enhanced performance* **7** *Frequent and reveals the need for new features or enhanced performance*	141	4.7	58.2%	25.5%	16.3%
State and regional regulations affecting your business are…	**1** *Are inappropriate and hinder your firm's ability to succeed* **7** *Are appropriate and assist you firm's ability to succeed*	169	4.2	36.1%	37.9%	26.0%
The state and regional environmental standards and safety regulations…	**1** *Are lax* **7** *Are strict*	162	4.8	37.0%	40.7%	22.2%
Investment in R&D is…	**1** *Discouraged by state and regional taxes and incentives* **7** *Encouraged by state and regional taxes and incentives*	196	4.8	42.9%	36.7%	20.4%!
State and local government support for investment in R&D (e.g. funding business incubators, creating consortia)…	*1 'Is scant ' 7 'Is ample'.*	198	4.8	46.0%	26.3%	27.8%
Government's overall responsiveness and ability to work with the needs of business is…	**1** *Low* **7** *High*	199	4.2	47.7%	18.6%	33.7%
The number of regional competitors for your business in your region is…	**1** *Low* **7** *High*	141	4.8	60.3%	13.5%	26.2%
Regional competition in your industry is…	**1 'Mild' 7 'Intense'.**	142	5.1	68.3%	9.9%	21.8%

High = 5,6,7 Neutral = 4 Low = 1,2,3

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	High	Neutral	Low
Specialized suppliers of your business's materials, components, machinery, and services are…	**1** *Mostly not available inside your region* **7** *Mostly available inside your region*	139	4.7	56.1%	18.0%	25.9%
Regional specialized suppliers of your business's materials, components, machinery, and services are…	**1** *Of very low quality* **7** *Comparable with the best quality elsewhere*	140	5.1	66.4%	20.0%	13.6%
Regional specialized suppliers assist your firm with new product and process development …	**1** *Infrequently* **7** *Frequently*	138	4.0	37.0%	31.9%	31.2%
Businesses in your region…	**1** *Hide information from other firms even when there is not a competitive reason to do so* **7** *Share information openly with other businesses*	136	5.0	44.9%	34.6%	20.6%
Your cluster…	**1** *Is still emerging, with a narrow range of firms and institutions involved* **7** *Is well developed with a broad range of firms and institutions involved'.*	138	4.6	40.6%	14.5%	44.9%
Relationships between firms and organizations in your cluster…	**1** *Do little to assist your R&D efforts* **7** *Are very important to your R&D efforts*	136	4.2	28.7%	25.7%	45.6%
Associations and organizations that represent your cluster…	**1** *Do not exist or are ineffective* **7** *Exist and effectively promote the interests of the cluster*	136	4.2	51.5%	20.6%	27.9%
Firms in your cluster…have no preference for the geographic location of their business partners	**1** *Have no preference for the geographic location of their business partners* **7** *Prefer to work with firms located in the region*	132	4.6	40.2%	21.2%	38.6%

High = 5,6,7 Neutral = 4 Low = 1,2,3

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	High	Neutral	Low
Firms and organizations in your cluster…(knowledge sharing) — see coding for scale points	**1** *Infrequently share knowledge* **7** *Frequently share knowledge*	136	4.5	41.9%	18.4%	39.7%
Firms and organizations in your cluster…(contribution to cluster-wide programs)	**1** *Rarely contribute to cluster-wide programs* **7** *Frequently contribute to cluster-wide programs*	136	4.6	43.4%	19.9%	36.8%
Firms and organizations in your cluster…(willingness toa ccept new members)	**1** *Are unwilling to accept new members into cluster activities and organizations* **7** *Treat entrepreneurs, start-ups, and new companies as full partners in all aspects of cluster cooperation*	134	5.0	42.5%	38.1%	19.4%
Firms in your cluster…(advantage in perceiving buyer trends)	**1** *Have no advantage in perceiving new buyer trends compared to firms who are not in a cluster* **7** *Perceive new buyer trends more rapidly than your competitors who do not operate within a cluster*	132	4.9	43.2%	37.9%	18.9%
				High = 5,6,7	Neutral = 4	Low = 1,2,3

Measure	Description of Rating Scale	Number of Respondents	Mean	Poor Location	Neutral	Good Location
Finally, considering all the significant factors, including government, industry and social factors, how good a location is your region as a place to innovate in your business?	**1** *Very poor location* **7** *Very good location*	201	5.4	6.0%	9.0%	85.1%

Measure	Description of Rating Scale	Number of Respondents	<25%	49%	25%–74%	50%–>75%
What proportion of idea generation and development is done within your firm, as opposed to by/with any of the institutions listed above?	**1** *Less than 25%* **2** *25% to 50%* **3** *50 to 75%* **4** *Greater than 75%* **9** *Not applicable*	126	2.4%	4.8%	20.6%	72.2%
What proportion of commercialization is done within your firm, as opposed to by/with any of the institutions listed above?	**1** *Less than 25%* **2** *25% to 50%* **3** *50 to 75%* **4** *Greater than 75%* **9** *Not applicable*	202	5.4%	4.7%	16.3%	73.6%

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	Frequently	Sometimes	Never
develop: Universities	**1** *Never* **2** *Sometimes* **3** *Frequently*	138	1.7	10.9%	44.9%	44.2%
develop: Community Colleges	**1** *Never* **2** *Sometimes* **3** *Frequently*	137	1.3	2.9%	24.8%	72.3%
develop: Public or Private Research Centers	**1** *Never* **2** *Sometimes* **3** *Frequently*	138	2.2	5.8%	33.3%	60.1%
develop: Regional Customers	**1** *Never* **2** *Sometimes* **3** *Frequently*	136	2.2	27.2%	62.5%	10.3%
develop: Other Firms in Your Industry	**1** *Never* **2** *Sometimes* **3** *Frequently*	139	2.1	23.0%	64.0%	12.9%
develop: Regional Suppliers	**1** *Never* **2** *Sometimes* **3** *Frequently*	138	1.8	13.0%	52.9%	34.1%
develop: Venture Capital Firms	**1** *Never* **2** *Sometimes* **3** *Frequently*	137	1.5	6.6%	35.8%	57.7%
develop: Business Incubators	**1** *Never* **2** *Sometimes* **3** *Frequently*	138	2.1	4.3%	31.9%	63.0%
develop: Industry or Cluster Associations	**1** *Never* **2** *Sometimes* **3** *Frequently*	137	1.8	10.9%	56.9%	32.1%
develop: Business Assistance Centers (SBA)	**1** *Never* **2** *Sometimes* **3** *Frequently*	139	1.3	2.9%	21.6%	75.5%

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	Frequently	Sometimes	Never
commerce: Universities	**1** *Never* **2** *Sometimes* **3** *Frequently*	135	1.4	3.0%	34.8%	62.2%
commerce: Community Colleges	**1** *Never* **2** *Sometimes* **3** *Frequently*	135	1.2	0.7%	16.3%	83.0%
commerce: Public or Private Research Centers	**1** *Never* **2** *Sometimes* **3** *Frequently*	134	1.3	2.2%	24.6%	73.1%
commerce: Regional Customers	**1** *Never* **2** *Sometimes* **3** *Frequently*	135	2.0	20.0%	60.0%	20.0%
commerce: Other Firms in Your Industry	**1** *Never* **2** *Sometimes* **3** *Frequently*	135	1.9	13.3%	68.1%	18.5%
commerce: Regional Suppliers	**1** *Never* **2** *Sometimes* **3** *Frequently*	135	1.8	10.4%	55.6%	34.1%
commerce: Venture Capital Firms	**1** *Never* **2** *Sometimes* **3** *Frequently*	134	1.3	1.5%	29.9%	68.7%
commerce: Business Incubators	**1** *Never* **2** *Sometimes* **3** *Frequently*	135	1.3	3.0%	25.9%	71.1%
commerce: Industry or Cluster Associations	**1** *Never* **2** *Sometimes* **3** *Frequently*	135	1.6	8.1%	48.1%	43.7%
commerce: Business Assistance Centers (SBA)	**1** *Never* **2** *Sometimes* **3** *Frequently*	133	1.2	0.8%	21.1%	78.2%

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	Satisfied	Neutral	Unsatisfied
sat: Universities	**1** *Unsatisfied* **7** *Satisfied* **DK** *or* **NA**	113	12.1	57.5%	23.0%	19.5%
sat: Community Colleges	**1** *Unsatisfied* **7** *Satisfied* **DK** *or* **NA**	100	18.2	42.0%	34.0%	24.0%
sat: Public or Private Research Centers (salk, scripps)	**1** *Unsatisfied* **7** *Satisfied* **DK** *or* **NA**	100	16.4	42.0%	35.0%	23.0%
sat: Regional Customers	**1** *Unsatisfied* **7** *Satisfied* **DK** *or* **NA**	125	7.3	64.8%	30.4%	4.8%
sat: Other Firms in Your Industry	**1** *Unsatisfied* **7** *Satisfied* **DK** *or* **NA**	121	7.1	56.2%	36.4%	7.4%
sat: Regional Suppliers	**1** *Unsatisfied* **7** *Satisfied* **DK** *or* **NA**	113	8.7	51.3%	38.1%	10.6%
sat: Venture Capital Firms	**1** *Unsatisfied* **7** *Satisfied* **DK** *or* **NA**	104	16.9	45.2%	32.7%	22.1%
sat: Business Incubators	**1** *Unsatisfied* **7** *Satisfied* **DK** *or* **NA**	104	15.8	40.4%	33.7%	26.0%
sat: Industry Associations	**1** *Unsatisfied* **7** *Satisfied* **DK** *or* **NA**	114	9.6	56.1%	28.9%	14.9%
sat: Business Assistance Centers (RTA, SBA)	**1** *Unsatisfied* **7** *Satisfied* **DK** *or* **NA**	101	16.8	32.7%	35.6%	31.7%

Satisfied = 5,6,7 Neutral = 4 Unsatisfied = 1,2,3

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	Helpful	Neutral	Not Helpful
enterpren: University-based networking organizations	**1** *Not at all helpful* **5** *Critically helpful*	186	3.4	33.9%	29.0%	37.1%
enterpren: University technology transfer offices	**1** *Not at all helpful* **5** *Critically helpful*	186	3.1	25.3%	30.6%	44.1%
enterpren: Regional industry or cluster councils	**1** *Not at all helpful* **5** *Critically helpful*	186	3.2	18.8%	45.2%	36.0%
enterpren: National trade associations	**1** *Not at all helpful* **5** *Critically helpful*	183	3.3	22.4%	43.2%	34.4%
enterpren: Economic development organizations	**1** *Not at all helpful* **5** *Critically helpful*	185	3.1	22.2%	32.4%	45.4%
estab co: University-based networking organizations	**1** *Not at all helpful* **5** *Critically helpful*	177	3.3	26.0%	35.0%	39.0%
estab co: University technology transfer offices	**1** *Not at all helpful* **5** *Critically helpful*	178	3.1	17.4%	35.4%	47.2%
estab co: Regional industry or cluster councils	**1** *Not at all helpful* **5** *Critically helpful*	177	3.3	23.2%	40.1%	36.7%
estab co: National trade associations	**1** *Not at all helpful* **5** *Critically helpful*	175	3.4	24.0%	48.6%	27.4%
estab co: Economic development organizations	**1** *Not at all helpful* **5** *Critically helpful*	176	3.1	16.5%	40.3%	43.2%

Helpful = 4,5 Neutral = 3 Not Helpful = 1,2

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	Agree	Neutral	Disagree
Companies that share lots of information with each other lose their competitive edge.	**1** *Disagree* **7** *Agree*	114	3.49	29.8%	14.0%	56.1%
Intense local competition between companies tends to contribute positively to the standard of living of the average citizen	**1** *Disagree* **7** *Agree*	114	4.50	57.0%	14.9%	28.1%
Companies that compete against each other in the region should establish closer ties and cooperative agreements than they have now.	**1** *Disagree* **7** *Agree*	114	4.37	49.1%	25.4%	25.4%
Entry of a new competitor in the region benefits the business environment	**1** *Disagree* **7** *Agree*	115	2.39	7.0%	8.7%	84.3%
Companies in close geographic proximity often end up sharing information that they otherwise would not	**1** *Disagree* **7** *Agree*	114	4.82	68.4%	12.3%	19.3%
Presence of intense local competition between companies tends to foster innovation.	**1** *Disagree* **7** *Agree*	115	5.57	92.2%	1.7%	6.1%
Where possible, companies should seek to train workers through cooperative training programs, rather than on their own.	**1** *Disagree* **7** *Agree*	115	4.57	51.3%	27.0%	21.7%
For most firms, the benefits of having local competitors outweigh the costs	**1** *Disagree* **7** *Agree*	115	4.63	54.8%	25.2%	20.0%

Agree = 5,6,7 Helpful = 4 Disagree = 1,2,3

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	Agree	Neutral	Disagree
Projects that require cooperation and collaboration between firms in my region tend to cost more then they return.	**1** *Disagree* **7** *Agree*	113	3.35	16.8%	32.7%	50.4%
Employees at every level of a company should be encouraged to exchange non-proprietary information with their peers at other firms.	**1** *Disagree* **7** *Agree*	115	3.88	42.6%	13.0%	44.3%
It is possible for companies to collaborate and compete at the same time	**1** *Disagree* **7** *Agree*	115	5.19	75.7%	6.1%	18.3%
Cooperation between local firms has contributed directly to the prosperity of the region as a whole.	**1** *Disagree* **7** *Agree*	115	5.01	67.0%	19.1%	13.9%
Companies are worse off when they have to compete with other local companies to attract and retain skilled workers	**1** *Disagree* **7** *Agree*	115	3.61	28.7%	18.3%	53.0%
Intense local competition between companies tends to help them increase productivity	**1** *Disagree* **7** *Agree*	114	5.01	72.8%	17.5%	9.6%
Firms in clusters…are better prepared to compete vs. isolated competitors	**1** *Disagree* **7** *Agree*	114	5.42	78.1%	14.9%	7.0%
Firms in clusters…benefit indirectly when other firms in the cluster succeed	**1** *Disagree* **7** *Agree*	114	5.21	78.1%	12.3%	9.6%

Agree = 5,6,7 Helpful = 4 Disagree = 1,2,3

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	Agree	Neutral	Disagree
Firms in clusters… are better protected from national economic downturns	**1** *Agree* **7** *Disagree*	114	4.18	43.9%	21.9%	34.2%
Firms in clusters…innovate at the same rate as firms not in clusters	**1** *Agree* **7** *Disagree*	114	5.20	75.4%	15.8%	8.8%
Firms in clusters…are more susceptible to downturns in their industry	**1** *Agree* **7** *Disagree*	114	3.40	18.4%	30.7%	50.9%

Agree = 5,6,7 Neutral = 4 Disagree = 1,2,3

Measure	Description of Rating Scale	Number of Respondents	Average	Beneficial	Neutral	Not Beneficial
How beneficial is your physical location in Atlanta to your firm's ability to innovate?	**1** *Not at all beneficial* **5** *Critically beneficial*	138	3.0	37.7%	29.0%	33.3%
In five years, how beneficial do you think your physical location in Atlanta will be to your firm's ability to innovate?	**1** *Not at all beneficial* **5** *Critically beneficial*	138	3.0	39.9%	29.0%	31.2%

Beneficial = 4,5 Neutral = 3 Not Beneficial = 1,2

Measure	Description of Rating Scale	Number of Respondents	Average	Fundamental Impact	Some Impact	Significant Impact	Hardly At All
To what degree has e-commerce (web-based and other electronic commerce) impacted your business operations?	**1** *Hardly at all* **2** *Some impact* **3** *Significant impact on business model* **4** *Fundamentally changed business model*	135	2.8	25.9%	36.3%	31.9%	5.9%

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	Not Important	Neutral	Important
Promote world-class primary and secondary education	**1** *Not at all important* **5** *Critically important*	198	4.6	1.5%	5.6%	92.9%
Promote specialized education and training programs to upgrade worker skills	**1** *Not at all important* **5** *Critically important*	196	4.2	5.1%	12.8%	82.1%
Implement tax reform to encourage investment in innovation (e.g., R&D tax credits)	**1** *Not at all important* **5** *Critically important*	196	3.7	7.1%	31.6%	61.2%
Speed up regulatory approval processes in line with product life-cycles	**1** *Not at all important* **5** *Critically important*	195	3.3	22.1%	36.9%	41.0%
Simplify compliance procedures for government regulations (e.g., one-stop filing, websites, etc)	**1** *Not at all important* **5** *Critically important*	197	3.5	11.7%	35.0%	53.3%
Reform liability laws to stimulate and reward next generation product innovation and safety	**1** *Not at all important* **5** *Critically important*	197	3.3	21.3%	33.0%	45.7%
Promote antitrust legislation to encourage competition	**1** *Not at all important* **5** *Critically important*	197	2.6	45.2%	35.5%	19.3%
Support the particular needs of start-up companies (access to capital, incubators, management training)	**1** *Not at all important* **5** *Critically important*	195	3.5	12.3%	36.9%	50.8%
Strengthen and modernize intellectual property protections (patents, copyrights) at home and abroad	**1** *Not at all important* **5** *Critically important*	196	3.4	18.4%	37.2%	44.4%
Provide services to assist and promote regional exports	**1** *Not at all important* **5** *Critically important*	194	3.0	36.1%	38.7%	25.3%

Important = 4,5 Neutral = 3 Not Important = 1,2

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Average	Not Important	Neutral	Important
Improve information and communications infrastructure	**1** *Not at all important* **5** *Critically important*	196	3.8	8.7%	29.1%	62.2%
Assist in attracting suppliers and service providers from other locations	**1** *Not at all important* **5** *Critically important*	196	3.0	31.6%	35.2%	33.2%
Promote universal computer literacy	**1** *Not at all important* **5** *Critically important*	196	3.6	14.3%	27.6%	58.2%
Government support for funding of specialized research institutes, labs, etc.	**1** *Not at all important* **5** *Critically important*	197	3.1	27.4%	34.0%	38.6%
Catalyze partnerships among government, industry and universities.	**1** *Not at all important* **5** *Critically important*	197	3.2	25.4%	32.5%	42.1%
Improve transportation and other physical infrastructure	**1** *Not at all important* **5** *Critically important*	197	4.3	3.0%	14.2%	82.7%
Increase funding for university-based research	**1** *Not at all important* **5** *Critically important*	197	3.3	22.8%	33.5%	43.7%

Important = 4,5 Neutral = 3 Not Important = 1,2

Measure	Description of Rating Scale	Number of respondents	Regionally based, regional sales	Regionally based, sell in region and outside	Unit of US company based elsewhere	Unit of foreign company
Which best describes the type of firm where you work?	**1** *Regionally based, sells primarily in region* **2** *Regionally based, sell both in region and outside* **3** *Unit of US co based elsewhere* **4** *Unit of foreign company*	138	18.8%	52.9%	19.6%	7.2%

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of respondents	End Consumer Manufac-tured Product	Busi-ness Service	Inter-mediate Input	Technical/ IT Support Product	Other
Which best describes your primary line of business	**1** *End-consumer Manufactured Product* **2** *Business Service* **3** *Intermediate Input* **4** *Technical/IT support product* **5** *Other*	95	11.0%	51.5%	2.9%	19.1%	14.0%

Measure	Description of Rating Scale	Number of respondents	1	2	3	4	5	6
Revenue Category	**1** *<$1 million* **2** *1 to 10 mill* **3** *11 to 50 mill* **4** *51 to 100 mill* **5** *101 to 300 mill* **6** *300 mill plus*	98	17.3%	24.5%	15.3%	4.1%	6.1%	2.9%

Measure	Description of Rating Scale	Number of Respondents	Spend Less	Spend Same	Spend More
Relative to your competitors in your industry, how would you describe your firm's expenditures on R&D?	**1** *Spend far less* **2** *Spend somewhat less (on a % basis) than competitors* **3** *Spend about the same (on a & basis) than competitors* **4** *Spend somewhat more (on a % basis) than competitors* **5** *Spend far more (on a % basis) than competitors*	121	28.1%	23.1%	48.8%

Measure	Description of Rating Scale	Number of respondents	1	2	3	4	5
Please estimate your company's average annual revenue growth over the past three years	**1** *Negative or 0%* **2** *1 to 10%* **3** *11 to 20%* **4** *20 to 100%* **5** *Over 100%*	132	3.0%	3.0%	21.2%	28.8%	28.0%

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Measure	Description of Rating Scale	Number of Respondents	Better than Average	Average	Worse than Average
Looking back over the past 5 years, how would you rate your company's performance relative to your company's competitors?	*1 Among the best in the industry* *2 Significantly better than average* *3 Somewhat better than average* *4 Just about average* *5 Somewhat worse than average* *6 Significantly worse than average* *7 Among the worst in the industry*	59	12.7%	12.7%	78.4%

Measure	Description of Rating Scale	Number of Respondents	1	2	3	4
Which best describes your position in your firm?	**1** *Owner, president, CEO* **2** *Sr. Executive/Sr. Official* **3** *Manager* **4** *Other*	194	54.6%	27.3%	4.1%	6.2%

Measure	Description of Rating Scale	Number of respondents	1	2	3	4	5
Education (Check highest completed)	**1** *Some secondary school* **2** *Secondary school* **3** *Some college* **4** *College graduate* **5** *Graduate Degree*	193	0.0%	2.1%	5.2%	38.3%	54.4%

Measure	Description of Rating Scale	Number of respondents	1	2	3	4	5
Age	**1** *20-29* **2** *30-39* **3** *40-49* **4** *50-59* **5** *60 or older*	196	2.0%	20.9%	25.5%	38.3%	12.2%

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Taking into account all the elements of the business environment that you have considered so far, which five currently have the greatest positive impact on your business's success? Which factors do you consider to be the greatest future threats to your business if not addressed? Please check off five (5) of the elements on the list below for both the Positive and Future Threat columns.

	Number of Respondents	Present	Future
Cost of doing business	44	16.4%	37.9%
Quality of transportation	45	10.3%	38.8%
Specialized facilities for research	7	22.4%	6.0%
Qualified scientists and engineers	15	35.3%	12.9%
Transfer of knowledge from research institutions	4	12.9%	3.4%
Communications infrastructure	3	13.8%	2.6%
Available pool of skilled workforce	33	18.1%	28.4%
Quality of K-12 education	33	8.6%	28.4%
Sourcing of employees from advanced educational programs	3	20.7%	2.6%
Access to capital	23	11.2%	19.8%
Demanding regional customers that provide feedback	0	5.2%	0.0%
Specialized needs of regional customers	3	4.3%	2.6%
State/local regs for production processes and products/services	12	2.6%	10.3%
State and regional environmental / safety regs	11	8.6%	9.5%
State and regional tax and incentives for investment in R & D	12	4.3%	10.3%
Predictability of government policies	17	5.2%	14.7%
Govt's overall responsiveness to the needs of business	11	4.3%	9.5%
Level of competition in your industry	27	6.0%	23.3%
Quality and in-region location of your suppliers	9	6.9%	7.8%
Assistance from regional suppliers for new product and process development	4	5.2%	3.4%
Relationships between firms and organizations in your cluster	8	11.2%	6.9%
Participation with regional institutions in R & D efforts	5	9.5%	4.3%
Overall quality of life for employees	11	44.0%	9.5%

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

Please check the areas in which your firm's adoption of e-commerce tools has had a positive influence on your business. (check all that apply)	Number of respondents	Percent of total respondents that checked this option
Eimpact: Increased efficiency of supplier replenishment	72	27.8%
Eimpact: Allowed firm to reduce reliance on distributors	72	4.5%
Eimpact: Improved internal knowledge flow	72	25.2%
Eimpact: Improved quality of information on customers	72	18.8%
Eimpact: Enlarged client base	72	8.4%
Eimpact: Improved worker productivity	72	16.3%
Eimpact: Improved customer and investor access to information about firm	72	22.3%
Current reason: Proximity to regional suppliers to your industry	115	4.5%
Current reason: Proximity to regional client base	115	14.9%
Current reason: Happenstance (Chance/Luck)	115	11.9%
Current reason: Prior relationship with local company	115	11.9%
Current reason: Access to skilled labor	115	29.7%
Current reason: Tax incentives	115	3.0%
Current reason: Air/Water Quality	115	0.5%
Current reason: Low traffic congestion	115	0.5%
Current reason: Proximity to regional research and development centers	115	30.7%
Current reason: Business-friendly political environment	115	16.3%
Current reason: Low cost of labor	115	3.5%
Current reason: Access to raw materials	115	0.5%
Current reason: Proximity to competing firms in your industry	115	5.9%
Current reason: Housing Affordability	115	2.5%
Current reason: low cost of commercial land	115	2.0%
Current reason: Proximity to executives principal residence	114	16.3%
Next 5 years: Proximity to regional suppliers to your industry	115	2.5%
Next 5 years: Proximity to regional client base	115	5.9%
Next 5 years: Access to skilled labor	115	22.3%
Next 5 years: Tax incentives	115	11.4%

RESULTS OF CLUSTERS OF INNOVATION INITIATIVE REGIONAL SURVEY™

	Number of respondents	Percent of total respondents that checked this option
Next 5 years: Air/Water Quality	115	1.5%
Next 5 years: high income inequality	115	3.0%
Next 5 years: Proximity to regional research and development centers	115	35.1%
Next 5 Years: Traffic Congestion	115	1.0%
Next 5 years: Business-friendly political environment	115	5.9%
Next 5 years: High cost of labor	115	19.8%
Next 5 years: Low access to raw materials	115	0.5%
Next 5 years: Distance from competing firms in your industry	115	2.0%
Next 5 years: High cost of housing	115	16.3%
Next 5 years: High cost of commercial land/property	115	15.8%

ABOUT
THE CLUSTERS OF INNOVATION INITIATIVE PARTICIPANTS

MICHAEL E. PORTER

Michael E. Porter is the Bishop William Lawrence University Professor at Harvard University and a leading authority on competitive strategy and international competitiveness. He co-chairs the Clusters of Innovation Initiative at the Council on Competitiveness and is a member of the Council's executive committee.

The author of 16 books and over 75 articles, Professor Porter's ideas have guided economic policy throughout the world. Professor Porter has led competitiveness initiatives in nations and states such as Canada, India, New Zealand, and Connecticut; guides regional projects in Central America and the Middle East; and is co-chairman of the Global Competitiveness Report. In 1994, Professor Porter founded the Initiative for a Competitive Inner City, a non-profit private sector initiative formed to catalyze business development in distressed inner cities across the United States. The holder of eight honorary doctorates, Professor Porter has won numerous awards for his books, articles, public service, and influence on several fields.

COUNCIL on COMPETITIVENESS

The Council is a nonprofit, 501(c)(3) organization whose members are corporate chief executives, university presidents, and labor leaders dedicated to setting an action agenda to drive U.S. economic competitiveness and leadership in world markets. The Council helps shape the national debate on competitiveness by concentrating on a few critical issues including technological innovation, workforce development, and the benchmarking of U.S. economic performance against other countries.

The Council's work is guided by a 30 member executive committee. Chief executives of 40 of the country's most prominent nonprofit research organizations, professional societies and trade associations contribute their expertise as national affiliates of the Council.

MONITOR GROUP

Monitor Group is a family of competitive service firms linked by shared ownership, management philosophy, and inter-related assets. Each entity in the Group is dedicated to providing products and services which fundamentally enhance the competitiveness of our clients. Our aspiration is to operate as an "intelligent switch" in a closely-linked global network of expertise and experience, not merely as a narrowly defined consulting firm, a research company or a merchant bank. We are dedicated to creating innovative, winning, action-oriented solutions by deploying our human, knowledge, and social assets in unique combinations dictated by each client's unique circumstances — consulting interventions, capital infusions, deal structuring, management development programs, customized software, cutting-edge market research, and so on as appropriate.

Monitor Group is organized into three major operating units:

- **Monitor Action Group**, which consults to top management to help resolve their most important and intractable competitive problems;
- **The Monitor Merchant Banking Group**, which marries capital investment with advisory services to enhance company competitiveness;
- **The Intelligent Products Group**, which provides customized data and software products to support competitive decision making.

ontheFRONTIER

ontheFRONTIER, has extensive experience in competitiveness assessment and cluster development projects throughout the United States and the world. Our private and public sector client base spans over twenty countries in North and South America, Europe, Asia, Africa and the Middle East. In addition, we have collaborated extensively with development agencies such as the World Bank Group and the United States Agency for International Development (USAID) on microeconomic development issues.

ontheFRONTIER's work focuses on improving business competitiveness through building winning strategies, fostering cooperation among clusters of firms, and facilitating productive dialogue between private and public sector leaders to promote innovation. Our vast network of partners forms the basis of our collaborative effort to diffuse a new web-based set of offerings. We are working with financial institutions, industry associations, multilateral agencies, and others to diffuse web-based business strategy tools and insights to businesspeople around the world. For more information, please visit www.ontheFRONTIER.com.