Future Work: Denver Metropolitan Area Jobs in a Globalizing Economy

Sharon Gabel
University of Denver

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Future Work: Denver Metropolitan Area Jobs in a Globalizing Economy

A Dissertation

Presented to

the Faculty of Natural Sciences and Mathematics

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In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

by

Sharon Gabel

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Advisor: Dr. Andrew R. Goetz
Abstract

In the past twenty years, globalization has had both observable and intangible impacts on business and labor markets at the local level, that are of critical importance to communities and the people who inhabit them. While impacts of global economic change on local labor markets have been anticipated, there is little insight in the research literature into the empirical dynamics of the interrelationship between global economic change and local labor markets. This study examined the impacts of globalization on local labor markets through three lenses: (1) quantitative analysis of employment change in the Denver Metropolitan Region local labor market, (2) quantitative comparison of six other metropolitan regional labor markets across different geographies, and (3) a qualitative analysis of explicit reports by participants in the Denver Metropolitan local labor market (people in business, consulting, the public sector, and education). The main hypothesis of this study is that, in metropolitan areas where the forces of global economic change are at work, two proxy measures for globalization, foreign direct investment (FDI) and export trade, have a statistically significant relationship to changes in industry employment in local labor markets. Quantitative analysis used multiple regression to identify correlation between industry employment and FDI and export trade. Results indicate that there is a correlation in selected industries where the geographic factors of location provided an explanatory basis for the results. Qualitative analysis revealed that respondents have cautious optimism regarding the economic promise of globalization and
still acknowledge the challenges that globalization brings into focus for the region’s business, education and government stakeholders. It also demonstrated the differences in perspectives of the respondents from different roles: business owner, enterprise employee, educator, and government official. The study concludes that the data support the hypothesis in select industries where there are geographic advantages, but they do not support the generalization of the hypothesis to all cases where FDI or international export trade affect industry employment. The study further finds that each of the metros examined have unique regional economic development entities that partner to attract FDI and encourage international export trade.
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<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>BEA</td>
<td>U.S. Bureau of Economic Analysis</td>
</tr>
<tr>
<td>BLS</td>
<td>U.S. Bureau of Labor Statistics</td>
</tr>
<tr>
<td>CTO</td>
<td>Colorado Tourism Office</td>
</tr>
<tr>
<td>DIA</td>
<td>Denver International Airport</td>
</tr>
<tr>
<td>DJIA</td>
<td>Dow Jones Industrial Average</td>
</tr>
<tr>
<td>DOD</td>
<td>Department of Defense</td>
</tr>
<tr>
<td>DOL</td>
<td>Department of Labor</td>
</tr>
<tr>
<td>EDC</td>
<td>Economic Development Corporation</td>
</tr>
<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>IPO</td>
<td>Initial Public Offering</td>
</tr>
<tr>
<td>ITA</td>
<td>U.S. International Trade Administration</td>
</tr>
<tr>
<td>NAICS</td>
<td>North American Industry Classification Standard</td>
</tr>
<tr>
<td>NASDAQ</td>
<td>National Association of Securities Dealers Automated Quotation</td>
</tr>
<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
</tr>
<tr>
<td>OEDIT</td>
<td>Colorado Office of Economic Development and International Trade</td>
</tr>
<tr>
<td>S&amp;P</td>
<td>Standard &amp; Poor's</td>
</tr>
<tr>
<td>SIC</td>
<td>Standard Industrial Code</td>
</tr>
<tr>
<td>SLSDC</td>
<td>St. Lawrence Seaway Development Corporation</td>
</tr>
<tr>
<td>UN/DESA</td>
<td>United Nations Department of Economic and Social Affairs</td>
</tr>
<tr>
<td>UNCTAD</td>
<td>United Nations Conference on Trade and Development</td>
</tr>
</tbody>
</table>
Chapter 1: Introduction

Introduction

The nature of work and the availability of jobs change over time. Sometime this change happens very quickly, in response to the rapid introduction of new technologies, or to fast-moving political or historical events. Other times, the change happens more slowly, as industries, business practices, and communities slowly evolve, in a more organic way. In the past twenty years, globalization – the functional integration and geographic spread of connected economic activities at the global scale – has had both observable and intangible impacts on business and labor markets at the local level.

This research study examines the impacts of globalization on local labor markets, and on the communities they are part of through three lenses: (1) quantitative analysis of employment change in the Denver Metropolitan Region local labor market, (2) quantitative comparison of six other metropolitan regional labor markets across different geographies, and (3) a qualitative analysis of explicit reports by participants in the Denver Metropolitan local labor market (people in business, consulting, the public sector, and education). The main hypothesis of this study is that, in metropolitan areas where the forces of global economic change are at work, two proxy measures for globalization, foreign direct investment (FDI) and export trade, will have a statistically significant relationship to changes in industry employment in local labor markets.
In addition to this introduction, Chapter One continues by framing the problem and provides background to the issue of local labor market impacts of globalization. It provides the working definition of the term *globalization* that is used for purposes of this study, and offers an initial description of the impacts of globalization on selected occupations to date. This chapter also articulates the broader questions about globalization impacts on local labor markets that led to the specific research questions that this research study is designed to answer.

Chapter Two provides the foundation for this research through a review of the literature pertaining to globalization and local labor markets. It summarizes the literature on global economic change and local labor markets broadly, and examines major themes in regional and local economic development, local labor market interrelationships, and labor market policy responses to global economic change. The literature review also situates this research study more specifically in previous scholarly work on human capital, education and skills in the context of local labor market evolution, and on the nexus between workforce skills, business strategy, and global business integration.

Chapter Three contains the first of three analytical components of the research study. The focus of this first analysis is the quantitative evaluation of employment changes by industry in the Denver Metropolitan Region. The chapter begins with an overview of the Denver economy, its historical roots, and how it has been connected to the national and global economy over time. The impact of globalization on economic growth in general, and on specific industries in particular give context to employment and
globalization impacts during the study period, 1990 to 2010. Efforts by local and regional organizations to attract foreign investment and support increased export trade are summarized and evaluated in light of impacts on local labor markets and sector employment. Regression analysis is used to quantitatively evaluate the accuracy of the hypothesis that FDI and export trade have statistically significant relationship to changes in industry employment in the Denver Metropolitan Region.

Chapter Four contains the second of three analytical components of the research study. The focus of this second analysis is a comparative quantitative study of employment changes by industry in seven different geographic locations over a twenty-year period. The seven locations – Denver, Atlanta, Chicago, San Antonio, Chattanooga, Boston, and Cleveland – are exemplars of a new taxonomy of urban classification based on changing urban demographic patterns that emerged through analysis of the most recent census (Brookings Institution, 2010). The chapter begins with an overview of the typology used as the basis for the seven metropolitan areas selected for the comparison. The historical and contemporary growth of industries in each of these metropolitan areas follows, along with insight into how globalization has been affecting them during the 1990 to 2010 study period. Industry employment in 5-year increments from 1990 to 2010 for each city is analyzed to identify trends by major sector. Next, regression analyses using foreign direct investment and international trade as independent variables form the basis for evaluation of the hypothesis that FDI and export trade have statistically
significant relationship to changes in industry employment in selected industries in these communities.

Chapter Five contains the third of three analytical components of the research study. The focus of this third analysis is a qualitative study of the Denver metropolitan region, based on explicit reports (survey responses) by participants in the local community and labor market (people in business, consulting, the public sector, and education). Using a qualitative approach leads to understanding of individual and collective conceptualization of workforce issues, and allows for exploration of individual experiences, perceptions, and responses to social processes that affect the nature and range of proposed solutions to labor shortages. Qualitative approaches are especially helpful in identifying future trends in labor and skill needs from diverse perspectives.

The research study concludes with Chapter Six, which synthesizes espoused theory, drawn from scholarly models summarized in the literature review, and the results of quantitative and qualitative analyses at the core of this research study. Conclusions drawn from the research and analyses performed for this study are included in this final chapter, along with potential future research paths to further the work of this study.

**Problem Identification, Background, and Research Questions**

In a rapidly changing world, where economies and businesses are subject to the forces of globalization, the nature and availability of jobs are of critical importance to communities. In recent years, communities have seen industries move away, change their
business requirements and workforce skill needs, or cut jobs as they streamline their operations. While impacts of global economic change on local labor markets have been expected, and conclusions about its impact have been made in news reports and policy panels, there is little in the research literature that provides insight into the empirical dynamics of the interrelationship between global economic change and local labor markets.

This dearth of research-based data is especially lacking when seeking sound empirical research on the perspective of firms, which have reported a shortage of employees with the types of new skills and capabilities that competing in a global business environment requires. And, on the supply-side, there is little empirical research in the literature that examines the transformation of local labor markets to produce more “up-skilled” labor pools to meet firm workforce demand, or the drivers and stakeholders in that transformation. By first identifying specific occupational employment shifts between 1990 and 2010, and then by gathering, interpreting and analyzing empirical reports from individuals in firms, government and non-profit agencies, and educational institutions, this study significantly advances understanding of the dynamic relationship between global economic change and local labor markets, two elements of the labor system which are neither well understood, nor well-researched from the in-depth case perspective that this study of the Denver metropolitan area will provide.

The term globalization has social, political, and cultural aspects, it is defined for the purpose of this study as a complex set of processes that operate in both space and
time, and are characterized by two principal attributes of economic activities: (1) the
degree of their functional integration, and (2) the extent of their geographic spread
(Dicken 2007). Measuring “globalization” has challenged researchers and policy-makers
since evidence of the phenomena was first noted by economists studying international
exchanges of goods, services and capital. The A.T. Kearney/Foreign Policy globalization
index is widely-used tool that measures key components of global integration such as
trade and investment flows, movement of people across borders, volume of international
telephone calls, Internet usage, and participation in international organizations (A.T.
Kearney, 2006). While this study will not examine the drivers of global economic change
per se, these key components will be among the data gathered from selected stakeholders’
explicit reports that will illuminate the interactions between firms and local labor markets
examined by this research study.

Recent debates over the “flattening” of the world by removing barriers formerly
associated with geography due to both technology and globalization are implicitly
addressed through this study. While the forces of globalization increasingly connect
businesses and communities of the world to each other, the reasons that specific
businesses and specific communities seek each other out and become economically
integrated are entirely to do with geography – the specific nature of places and the people
who inhabit them. Even the venerated author of the phrase “the world is flat” stipulates
that the notion of a flat world is no more than an explanatory metaphor to better enable
people to comprehend the equal power to connect, collaborate, compete and interact that
internet technology has made possible. Assuredly, the economic nature of place is what draws foreign direct investment to a region, and the economic capabilities of business in a region enable the option of exporting its products and service for international trade. In no way is globalization in these forms agnostic to geography.

The context for globalization in the past two decades was influenced by the history of international trade and domestic economic factors reaching a century or more back into the country’s history. President Woodrow Wilson’s commitment to internationalist foreign policy was reflected in the passage of the 1913 Underwood Tariff Act, which reduced import tariffs. The 1934 Reciprocal Trade Agreements Act, enacted during the presidency of Franklin D. Roosevelt, signaled the beginning of the 20th century trend in U.S. policy toward lower trade barriers and greater global economic engagement in two ways. First, it made trade a shared congressional and executive brand responsibility, sheltering elected officials from protectionist constituencies. Second, the Act instituted the so-called “bargaining tariff” that linked tariff setting to international negotiations bi-laterally, and thus lay the groundwork for the General Agreement on Tariffs and Trade (GATT), signed by Harry S. Truman in 1947.

Major milestones in U.S. international trade policy accompanied the Kennedy Round (1962 – 1967), the Tokyo Round (1973 – 1979), the Uruguay Round (1986 – 1994), and the Doha Round (2001 – present). Seeking more timely trade agreements outside of the GATT framework led the United States to pursue a series of Free Trade Agreements (FTAs), starting with the 1985 bilateral free trade agreement with Israel, an

The impacts of the liberalization of trade through formal trade agreements has resulted in increases in both inward and outward flows of goods and services between the United States and other countries. This has been particularly true in the past two decades, as international trade data between 1992 and 2013 show in Figure 1 below:

Figure 1: Balance of U.S. Trade (Goods and Services), 1992 to 2013 (in $millions)

This increase in international trade signaled increasing engagement in the global economic system by the United States, and accompanied a rise in overall economic welfare of the nation. Between 1990 and 2013, United States, gross domestic product
(GDP) increased 181 percent from US$5.9 trillion to US$16.8 trillion (U.S. Department of Commerce, 2014). The trajectory was not continuously positive, however. The two decades from 1990 to 2010 saw a domestic economy that swung from rising stock markets, due in large part to investor confidence in technology stocks, which were highly publicized when the shares went public through initial public offerings (IPOs), to deep declines across all the major stock indices (Ritter, 2013; NASDAQ, 2014; Standard & Poor, 2014, Dow Jones, 2014). Table 1 below shows the sharp increase in IPOs in the 1990s, and Figure 2 shows the sharp increases in stock prices to shortly after the dot-com bubble burst after 2000. The tech-heavy NASDAQ (in green) shows that exchange’s predilection for technology stocks, greater than both the S&P and the DJIA:

<table>
<thead>
<tr>
<th>Decade</th>
<th># Initial Public Offerings</th>
</tr>
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<tbody>
<tr>
<td>1970-79</td>
<td>137</td>
</tr>
<tr>
<td>1980-89</td>
<td>2794</td>
</tr>
<tr>
<td>1990-99</td>
<td>4617</td>
</tr>
<tr>
<td>2000-09</td>
<td>1596</td>
</tr>
<tr>
<td>2010-13</td>
<td>681</td>
</tr>
</tbody>
</table>

*Table 1: Initial Public Offerings (IPOs), 1970 to 2013*

*Figure 2: Major U.S. Stock Exchange closing prices, 1975 to 2008*
Despite economic turbulence domestically in the U.S., international trade increased by double digits annually, even after the recessions of 2001 and 2008 to 2009, as shown in Figure 3 below.

![Graph showing export of goods and services, percentage change by year, 1992 to 2012.](image)

**Figure 3: Export of Goods and Services, Percentage Change by Year, 1992 to 2012**

The economic cycles experienced by the United States in the period from 1990 to 2010 were shared by nations in the world economy. Rising from the recession of the late 1980s, the early 1990s saw sluggish economies worldwide. In the U.S., consumer confidence lead to increased consumer spending in the early 1990s, which then spilled over to fuel the increased spending on technology stocks as the “Information Revolution” and the technological infrastructure supporting it gained speed. Recovery was slow but steady in the early part of the decade in the major economies, including the European Union, North America, and China. However, Japan’s asset bubble burst rather slowly, leading Japan into what the Japanese call *The Lost Decade*. 
The post-9/11 economic shock spread beyond the U.S. to global markets, and governments increased monetary expansion in an effort to combat the economic slowdown. This action led to low interest rates in the 2001 to 2007 period, which laid the foundation for the housing mortgage credit crisis and liquidity problems in the global interbank market in 2007 and 2008. This financial crisis lay at the foundation of the Great Recession, which affected global economies in both developed and developing countries. As countries of the world started to emerge from the initial economic shock in 2009 and 2010, several countries experienced a secondary recession. In Europe, there were economic troubles related to the European sovereign debt crisis and austerity. Globally, nations and their citizens reeled from the economic effects of high levels of household debt, trade imbalances, high unemployment, and limited prospects for growth. In 2014 key global economic challenges include high unemployment, flattening commodity prices (which will have a moderating effect on international trade), reduced FDI to developing nations (with steady investment expected in less risky developed nation markets), and uncertainty related to the easing of governments’ monetary stimulus policies (or “quantitative easing”) (UN/DESA, 2014).

In the United States, from 1990 to 2010, employment grew by 19 percent (from 104 million to 124 million FTE), and the country experienced major occupational shifts. Employment was down 38 percent in manufacturing, up 113 percent in services, and down 2 percent in government (U.S. Department of Commerce, 2014). During this period, there has been an increasingly vociferous cry in the popular press about the “War for
Talent”. Unemployment remains an issue of concern in most communities. This is most commonly caused by one of two factors: (1) the mismatch in available versus required skills, or (2) a spatial mismatch in where the workers and jobs are. The available skills mismatch may be due to the transformation from a manufacturing economy to a service and information economy, or may result from changing technologies that require different skills in advanced manufacturing and other industry technologies that workers in the “old” industry lack. The spatial mismatch may occur when new industries locate in regions other than where the older industries existed, or when skilled labor does not move to the new location of an industry. An example of the latter is the shift in automobile production facilities from the Great Lakes to the U.S. South (Tennessee, in particular). Some of the Detroit labor force chose to move to Tennessee, while others did not.

Workforce labor structure is important to communities on several levels. First, it defines the character and opportunities for a community. Second, diversification of local labor structures makes communities more resilient. Finally, local labor structure is an indicator of potential impacts of macro trends (global business shifts). For workers, employers, educators, and policy-makers in the Denver metropolitan area, understanding the impacts of global economic change on local businesses, their competitive potential, and the availability of high-demand skills in the local labor market are literally a matter of putting food on family tables each day, and of firm success or failure in the changing business environment. If metro region firms cannot find the labor pool they need to
compete, they will relocate or close. Both scenarios will mean loss of jobs to the region, and to the individuals that previously held them.

Research to date suggests that global economic change in developed countries results in the decrease and increase of jobs in specific occupational areas. On the one hand, there is a departure of high-wage manufacturing and routine information processing jobs (Figure 4). There are increases in job opportunities in financial services (banking, finance, and trade), high-skilled information product design jobs, and professional services jobs (consulting, legal and other business services) (Dicken, 2007).

![Figure 4: Processes of restructuring in global cities Source: Friedmann, 1986](image-url)
This research study aims to test the specific case of the Denver Metropolitan Region against espoused theories to determine if the impacts of global economic change predicted by previous research are materializing in the local community, and how they are doing so in ways unique to the local geography of the case study region. By assessing how restructuring processes affect jobs in particular occupational sectors at the community level, a foundation can be laid to address the impacts on local economies and implications for policymaking and workforce development programs.

From its roots as a mining camp provisioning source until recent years, the Denver metropolitan region depended strongly on regional extractive industries for its economic base. The “boom and bust” cycles typical of natural resource-based economies brought eras of plenty and scarcity to the city and its residents. This was true first of gold and silver in the late 1800s, and later with oil and gas through the mid-1980s (Leonard & Noel, 1990). The last two decades of the past century saw a restructuring of the state’s economy, shifting focus to new business ventures in the telecommunications and information technology industries, financial services, and retailing (Murray, 2002). This shift has diversified the regional economy, and shows promise for greater resilience during recessionary cycles, as was demonstrated during the post-9/11 economic slump of 2001 to 2003 and the recent climb out of the “Great Recession” of 2008 to 2010.

This study is of interest to geographers for two essential reasons, although others exist. First, the effects of globalization vary by geography – location, economic and other attributes of place affect how globalization manifests in different situations. Second,
globalization is a diffusion process – and geography influences the nature, rate and location of its spread throughout the world.

Broadly speaking, research on this topic needs to render understanding of how globalization affects the nature and number of jobs at the community level. Some general questions that provide a starting point for exploration are:

- What are the impacts of globalization on the talent available to firms in local labor markets?

- What are the programs and policies supporting development in occupations and skills in demand in a globalizing economy?

These questions lead to more specific ones:

- What changes in workforce knowledge and skills, attributable to economic change at the international level, have firms experienced during the period between 1990 and 2010?

- How have firms, local and state planners, and vocational educators responded to these changing workforce needs?

- What will the jobs of the future be? Why?

The dynamics are complex, with drivers of economic change acting – and manifesting – at global, national and local levels. Local, state, and national entities respond to the changes driven by globalization and, likewise, global firms adapt and
respond to measures taken at national, state, and local levels. At the same time, local labor markets both influence and are influenced by global and national economic change, manifested in local and regional economies.

Local agency is a strong force that influences the dynamics at play, and global players seeking to draw competitive advantage from local economies are often blocked from later transporting those advantages elsewhere by the deep embeddedness of local economies. Location decisions of both national and global firms are influenced by proximity to geographic concentrations of inputs (such as raw materials, specialized knowledge workers, or specialized industry service maturity) and outputs (such as specialized markets that may be created by externalities, knowledge spillovers or scale) (Storper, 2000). These clusters contribute to innovation, another key factor in drawing global firm activity to a particular place.

A firm’s business strategy can be influenced by local factors, such as when adaptation and decentralization are required to sell customized products to differing markets, or when competitive advantage is served by the presence of capable, locally based suppliers or complementarities related to the presence of competitive related industries (Prahalad, 1987; Porter, 2000). Finally, agglomeration or clustering effects lead to the establishment of industrial districts that are deeply embedded in both the economy and social fabric of local communities (Asheim, 2000; Shayer and Fredrick, 2000).

Altogether, the interactions between global economic change and local labor market adjustments form a dynamic system that is not well understood. Nor is the impact
on local labor markets when a firm that is local or regional decides to “go global”. The purpose of this research is to conduct an in-depth case study of the Denver metropolitan area in order to answer the following question: **How has global economic change between 1990 and 2010 affected the workforce requirements of local firms in the Denver metropolitan region, and how have the community and local labor markets responded to the effects of globalization on the workforce?**
Chapter 2: Literature Review

Although global economic change is not a new phenomenon, the acceleration of economic integration in the past half century of developed, and less-developed countries such as Brazil, Russia, India and China has increased the impact of globalization on communities at all scales. While some communities have been affected to a greater degree than others, linkages and impacts are deepening and broadening wherever economic activities are taking place. Businesses and governments are aware that they need to adapt in order to provide sustainable local and regional communities for their employees and citizens in a changing world. Changing labor market structure and transformation of occupational demands are a core element of local and regional economic viability.

While there are clear linkages between firm activity and economic production specific to spatial characteristics and advantages, economic geographers have developed their interest in the geography of local and regional labor markets only in the past 40 years. Because people are less mobile than capital, the geographic characteristics of the places they live and the firms that employ them are best studied at the local or regional scale, keeping in mind the macro-level forces at work that impact locales and regions.
This literature review explores the development of scholarly thought on global economic change, its impacts on local labor markets, and on the people who live within regions undergoing economic change driven by globalization.

**Overview**

A review of research literature by geographers and selected members of other disciplines reveals themes that fall into the following six categories, with key contributions relevant to this study summarized below:

1. Local labor markets (their definition, development, and interrelationships)

2. Regional or local economic development processes and prospects

3. Global economic change and impacts on regional or local labor markets, including local labor market impacts of foreign direct investment (FDI) and trade (export trade, in particular)

4. Human capital, education, and skills in the context of local labor market evolution

5. Labor market policy and alternative responses to global economic change impacts

6. Management theory, business strategy, changing workforce skills, and global business integration

The literature on labor force differences across space parallels changes in the conceptualization of labor, and its importance to economies at various scales. Economists
have traditionally considered labor to be a location “factor cost” that varied from place to place. From the 1930s to the mid-1970s, economic geographers shared this view of labor as an input to a firm’s location function, or as a cost of operation in the Fordist world (Martin 2000). In the late 1970s, as post-Fordist approaches and models emerged, Marxist economic geographers like Doreen Massey articulated the spatial division of labor: “… the idea that regional development and the distribution of employment are spatial expressions of the technical and social organization of the labor process, (and) subject to control and exploitation” (Massey 1984). Storper and Walker (1984) continued exploring the unique attributes of labor performance, control, and reproduction in specific places, and viewed labor as relatively immobile, especially compared to the increasing mobility of capital and technology.

**Local labor markets: their definition, development, and interrelationships**

Local labor markets influence and are influenced by global and national economic change, manifested in regional and local economies. Since the late 1980s and mid-1990s, economic geographers have developed the notion that labor operates and is regulated at the local level, where local factors and labor processes create and destroy jobs, set wages, and influence how firms hire and fire workers in local labor markets. The labor market is seen as a key site of social, institutional and regulatory practices, and these practices are changing dramatically as globalization and localization lead to striking differences in

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1 “Fordism” refers to the mode of economic development characterized by national or global vertically integrated firms producing standardized commodities on a mass scale. Named after Henry Ford, the originator of mass production techniques, Fordism has given way in recent years to “flexible” approaches to economic development, characterized by rapid and revolutionary technological and organizational structural and governance changes.
labor market performance between nations, and their configuration within nations (Martin 2000).

A foundational question for economic geographers researching local labor markets is their definition. Early literature by economic geographers regarding the definition of local labor markets is rooted in early work by C. L. Carmichael, who pointed to the limitations of Britain’s historic regional characterization of the effects of industrial change (Carmichael 1978). Later work by Susan Hanson and Geraldine Pratt (1992) focused on place-based social constructs of both workers and employers and their influence on the analysis of the delimitation and reproduction of local labor markets. Hanson and Pratt identified the numerous ways in which workers and employers developed “dynamic dependencies”, carved out small-scale labor markets within metropolitan areas, and noted how these micro-markets were shaped by (1) the traditional measure of journey-to-work (expanded to account for actual access to the labor market), (2) the finding and filling of jobs (through placed-based social networking mechanisms), and (3) residential “rootedness” of both workers and employers (Hanson and Pratt 1992).

More recently, Angel Cebollada (2009) extended research into social exclusion from local labor markets in his work on daily mobility and access to work in the Barcelona Metropolitan Region. Cebollada notes that social exclusion is a multi-dimensional concept, and draws on anthropology and other disciplinary literatures to deepen and expand his geographic analysis. In his most recent research, Cebollada focuses on the access that women, young adults, and immigrants have to work in three
typologies of spatial location: (1) dense and multi-functional central urban areas, (2) peripheral urban areas with limited functional diversity (primarily residential), and (3) peripheral low-density suburban areas that have a distinct single-functional character (residential, industrial, or commercial). Cebollada concludes that transition from traditional compact urban forms, with mixed uses and relatively high densities, has led to greater social exclusion from the local labor markets (Cebollada 2009).

Building on the notion of labor market definition beyond physical transit attributes, Ian Shuttleworth added the idea of the segmentation of local labor markets through regulation, as well as commuting behavior, in his deliberation of cross-border and transnational labor flows. He critiqued both approaches for their inability to address labor market access differences by demographic, social and occupational groups, and shed light on labor recruitment beyond traditional boundaries, and the role of state borders in shaping and regulating quantities and types of transnational labor. Shuttleworth concluded by suggesting the development of a new hybrid of local and national labor markets, and recommending further research into the relationships between state borders, workers’ rights, employers’ recruitment strategies, and labor market institutions (Shuttleworth 2007).

A second theme in local labor market literature is attention by geographers and economists to intra-metropolitan shifts in labor market structure and the influence of proximity on both local economic success and labor market impacts. Keenan Dworak-Fisher (2003) analyzed the adjustment of local labor markets to intra-metropolitan shifts
in labor demand, and showed that a relative increase in labor demand in a given metropolitan sub region resulted in increased nominal wages and employment probabilities. His work also demonstrated that subpopulations with low levels of education were least likely to benefit from enhanced opportunities. Dworak-Fisher concluded that education level (specifically, less education), rather than race or other demographic attributes, had the greatest negative impact on adjustment to sub region labor market shifts. He also demonstrated that supply of labor within metropolitan areas is not perfectly elastic across space, and that the adjustments of some groups of workers are especially constrained (Dworak-Fisher 2003).

Focusing on the shared labor market of neighboring counties, Spencer Glendon and Jacob Vigdor (2003) conducted correlation analysis that demonstrated neighboring counties experienced employment variations because (1) they produced similar products for the national market, (2) firms in neighboring counties directly cooperated in the production of some goods, or (3) employment shifts in one county changed the demand for locally produced and consumed goods within a multi-county area. Glendon and Vigdor concluded that economic risk (and its implications for changes in the local labor market) can be avoided through diversification of local production. Their work also supported their conclusion that a county that produces export goods significantly different its neighbors’ export goods will be relatively independent from employment variations (Glendon and Vigdor 2003).
Richard Shearmur, William Coffey, Christian Dubé and Rémy Barbonne (2007) more recently provided a deeper study of intra-metropolitan shifts in local labor markets. Exploring employment distribution and growth at a fine spatial scale, Shearmur et al. contend that most North American metropolitan areas have multinucleated or polycentric economic structures due to the decentralization of employment. They use the term “employment zone” rather that a host of others to indicate areas of employment (and thus, economic activity), and identify six employment zone types:

1. CBD core (over 5,000 jobs)
2. CBD fringe (500 to 5,000 jobs linked to the CBD core)
3. Major zone core (areas outside the CBD with over 5,000 jobs)
4. Major zone fringe (500 to 5,000 jobs linked to a major zone core)
5. Secondary employment zones (contiguous areas, each with 500 to 5,000 jobs)
6. Isolated zones (single area with 500 to 5,000 jobs)

In their study of Toronto, Montreal, and Vancouver, analysis conducted at the enumeration area (EA) level showed that employment churning (growth and decline) at the fringe of core zones was, in fact, happening in all six of the employment zone types, as well as across the inter-metropolitan area. Shearmur et al. concluded that using sub-census tract level data and then viewing the results from a macro-level perspective allows researchers and planners to see shifting employment patterns and trends in a metropolitan labor market that are occurring at a micro-spatial scale (Shearmur et al. 2007).

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2 In Canada, the enumeration area is a subunit of census tract level data.
Recent research by Judith Hellerstein, Mark Kutzbach and David Neumark examines spatial, residence-based labor market networks, focusing in particular on worker turnover. They find that there is evidence to support the conclusions that (1) workers who are more connected to their neighbors have lower turnover (a better job match in the local labor market), (2) this is true of neighbors from the same racial or ethnic group, but (3) this is not true when co-workers share the same racial or ethnic group but are not connected as neighbors. Thus, it is the “neighborly connection” that is the key to productive job matches (and low turnover) rather than similar racial or ethnic background (Hellerstein et al. 2014).

A third theme in local labor market literature is the focus on labor market structure for specific occupational groups. In their study on labor markets for technology-related occupations, Karen Chapple, Ann Markusen, Greg Schrock, Daisaku Yamamoto, and Pingkang Yu (2004) expanded the definition of “high-tech” occupations to include science and technology fields instead of the maturing industries of traditional high technology fields (computers, electronics, and telecommunications), and identified a separate “I-tech” (information technology) category to include occupations with high information technology content (such as database administrators, computer and numerical/process control programmers, and computer systems analysts). Their results demonstrate that several services and manufacturing sectors have not been included in previous studies, including engineering and architectural services, management and public relations, pharmaceuticals, research and testing services, and medical instruments.
(all among the fastest-growing industries in the United States in the early part the decade). Additionally, Chapple et al. identified metropolitan areas where both “high tech” and “I-tech” occupational growth was taking place (Chapple et al. 2007).

The research examined above addresses location, access, and development policy (zoning) aspects of local labor market definition, however it does not identify linkages between economic cycles (either local or global) and their impacts on labor market delineation and composition. Through the explicit reports gathered by this study, the researcher will gain an initial understanding of the interaction between economic forces and workforce skill demands and availability in local labor markets. Having examined the literature on local labor markets, their definition and development, we turn now to the body of research on regional and local economic development processes and prospects.

**Regional or local economic development processes and prospects**

Since local labor markets are tightly interwoven with local and regional economies, we now move to the second strand of the literature, which deals with local and regional development. In the late 1980s, when local economies were undergoing significant restructuring, Kevin Cox and Andrew Mair focused on the role of colony in strong, proximate economies. Research on this category includes studies of the role of local dependence in economic development, and as a means to bring together various potentially competitive community stakeholders together to foster local development and strengthen their viability regarding economic competition between communities. Key factors in local dependence identified were (1) spatial immobility of built environment
investments and (2) nonsubstitutable local exchange linkages such as predictability, trust, unique local knowledge, and brand loyalties (Cox and Mair 1988).

Place-specific production has always played a strong role in local and regional economic development. The contribution of place-specific advanced manufacturing is the focus of work by Meric Gertler (1995), David Rigby and Juergen Essletzbichler (2000), and Stuart Gabriel and Stuart Rosenthal (2004). To start, Gertler notes that the flexible manufacturing approach characteristic of post-Fordist economic systems has consequences for employment relations, the organization of work within firms, and broader social divisions of labor. As such, flexible production is intertwined with work “culture”, including work practices and training regimes. Gertler further concludes that the success of both (1) the adoption of complex production equipment and (2) production of that equipment rely on proximity of user and producer, who share common work “cultures”. Co-location in a local or regional spatial context is a prerequisite for this synergistic relationship to be established and flourish (Gertler 1995).

Rigby and Essletzbichler identified five sources of regional productivity growth: (1) changes in industry mix, (2) technological change by incumbent plants, (3) selection or changes in market shares, (4) plant entry, and (5) plant exit. Their research concluded that increased efficiency within plants was the primary source of regional productivity growth, followed by plant exits. In the latter case, productivity rose as competition forced the less productive plants from the local or regional market (Rigby and Essletzbichler 2000). Shifting the focus to the relative attraction of communities to businesses and to
potential workforce members, Gabriel and Rosenthal’s research on the impacts of metropolitan attributes on labor demand and supply curves since attributes preferred by firms shift the labor demand curve of a city, and attributes preferred by households (the workforce) shift the labor supply curve of a city. Their research concluded that the attributes preferred by firms are not the same as those preferred by the workforce (households). So, a significant challenge to local and regional development planners and policy-makers is how to cultivate attributes sought by both firms, and also by the workforce they seek to employ (Gabriel and Rosenthal 2004).

Addressing the issues of struggling locales, a recent study by George Hobor on economic restructuring of the urban “rust belt” concluded that communities have successfully transitioned through deindustrialization by either (1) diversifying manufacturing to become post-industrial producers, or (2) specialized, retaining former manufacturing in branch plants. Rust Belt cities not following either of these paths typically have a healthcare economy, which Hobor characterizes as a kind of economic safety net, rather than a potential resource to attract or support new industries to the city (Hobor 2012).

As local and regional economies turn increasingly towards knowledge-based services and industries, researchers have focused their work on these phenomena as well. Enrico Moretti and Per Thulin’s study of local employment multipliers in the United States and Sweden, and the research of Belal Fallah et al. on high-tech employment growth in U.S. counties are two recent examples exploring regional employment
processes. Moretti and Thulin concluded that the addition of jobs to the traded sector result in the creation of 1.4 – 1.6 times as many jobs in the non-traded sector. The multiplier effect is higher if the jobs are high-technology jobs or require high levels of human capital (as measured by educational attainment). Other factors affecting the local multipliers include: consumer preferences for tradable and non-tradable goods, the non-tradable sector production function, the type of new jobs created in the tradable sector and their salary levels, and the elasticity of the local labor and housing supplies (Moretti and Thulin 2013).

In a refinement of research into multiplier effects on local labor market employment, Giulia Faggio and Henry Overman investigated the impact of public sector employment on local labor markets in Britain between 2003 and 2007. They conclude that while public sector employment has no effect on total private sector employment, it does affect the composition of private sector employment. Specifically, the researchers found that each additional public sector job creates 0.5 jobs in the non-tradable sector (construction and services) and “crowds out” 0.4 jobs in the tradable sector (manufacturing). Faggio and Overman conclude that, for Britain, low labor supply elasticity means that increases in tradable private sector employment tends to crowd out other local (non-tradable) private sector employment, which they contrast with Moretti’s research on local labor processes in the U.S., where expanding tradable private sector

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3 Moretti and Thulin define the traded sector as manufacturing and the part of the service sector that are exported outside the local economy. They define the non-traded sector as services that are locally produced and consumed.
employment also expands non-tradable private sector employment (Faggio and Overman 2014).

Research by Belal Fallah, Mark Partridge and Dan Rickman focused on the role of geography in high-tech employment growth at the county level. Their results indicated that urban agglomeration economies are more important to the growth of high-tech employment than within-industry clusters at the county level. They also found that human capital is more important for high-tech employment growth than employment growth on average, and this effect is strongest in the fastest growing counties (Fallah, Partridge, Rickman 2013).

The national policy context and forms that industrial districts take are contributing factors in local and regional economic development. Nancy Ettlinger (1994) and Sean Digiovanna (1996) took a comparative approach to national policy and regional economic development, analyzing differences and similarities between nations with advanced economies: specifically the United States, Germany, Italy and, for Ettlinger, Britain. The contribution of cooperativeness and sense of community to successful regional development strategies was at the core of Ettlinger’s research findings. In each of the regions studied, Ettlinger identified the ways and degree to which national policies interacted with local and regional interests to support economic development and growth, noting for each case the role kin and non-kin networks played in the success of development initiatives. In addition, Ettlinger identified ways in which closely knit immigrant communities within larger urban metropolises reproduce the effects of local
community collaboration: (1) they employ low-cost workers (usually family members) to work long hours and generate working capital, (2) they gain access to skills and training through informal apprenticeships, (3) they gain access to capital through informal credit-raising mechanisms or informal social ties, and (4) they create or join formal or informal trade associations (Ettlinger 1994).

In contrast to Ettlinger’s work, Sean Digiovanna’s research focused on the variation of institutional structures characterizing flexibly-specialized industrial districts in specific locales within the countries studied: Emilia-Romagna (Italy), Baden-Wurttemberg (Germany), and Silicon Valley (USA). Like Ettlinger, Digiovanna advised planners to consider social relations when choosing among models of regional development. Unlike Ettlinger, Digiovanna focused on the role of trade and labor unions as modes of social reproduction and collaboration, rather than kinship linkages. In Baden-Wurttemberg in particular, Digiovanna highlighted the positive contribution of union co-determination to regional economic success. He noted the lack of collaboration in the densely networked Silicon Valley, engendered by a growing number of lawsuits between members of the same industry. Digiovanna concluded that there are three key questions that regional governments and economic development planners must consider: (1) the relevance of unions, (2) regionally-sponsored or supported training, and (3) the redistributive power of government and its proper exercise to ensure a social safety net for a workforce buffeted by the rapid change that flexible economies require (Digiovanna 1996).
While Digiovanna included definition of the components of the industrial district model in his work (flexible production driven by constant innovation with competition based on quality, not cost), Ann Markusen rejected the new industrial district in both the dominant Marshallian⁴ and New Italianate forms as the only possible forms. She developed three additional models: (1) hub and spoke districts, (2) satellite industrial platforms, and (3) state-anchored industrial districts. Providing detailed descriptions of the relative attributes and characteristic community relationships, Markusen advised regional planners and governing bodies to assess existing industrial district structures accurately and design development strategies around them (rather than inventing anew). She also concluded that national governments should investigate national policy impacts on local and regional development, and on the potential success or failure of industrial districts, and modify actions and policies accordingly (Markusen 1996). This view contrasts with the sanguine acceptance of the positive nature of national policy intervention found in the work of Ettlinger, and to some extent, Digiovanna.

Regional variation in knowledge-based entrepreneurial activity was the focus of a study by Haifeng Qian, Zoltan Acs, and Roger Stough that offers a model of regional entrepreneurship systems. Focusing on regional measures of entrepreneurship such as new firm formation, this model identifies new knowledge as one source of entrepreneurial opportunities and human capital as the major source of entrepreneurial

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⁴ The Marshallian, or new Italianate industrial district, is a spatial concentration of specialized small and medium-sized firms, supported by a variety of regional institutions for promoting coordination, learning, and innovation. Dense interactions among a large number of competing and cooperating firms create an external economy favoring technological innovation and learning.
absorptive capacity (defined as the ability of an entrepreneur to understand new knowledge, recognize its value and commercialize it by creating a firm). Examining data for U.S. metropolitan areas, Qian, Acs, and Stough conclude that entrepreneurial absorptive capacity is a critical driving force for knowledge-based entrepreneurial activities, and that while the presence of universities in communities raises levels of human capital needed for entrepreneurship to flourish, they also “corner the market” for the same human capital that might start new firms, thus removing it from the regional knowledge-based labor pool (Qian, Acs and Stough 2013).

*Global economic change and impacts on regional or local labor markets*

Moving from internal regional and local markets and economic processes, we now shift to the literature on the effects of global economic change and its impacts on regional or local labor markets. Researchers Peter Dicken (1994, 2007), Richard Florida (1996), and Amy Glasmeier and Robin Leichenko (1996), were among the first economic geographers to pay close attention to the geographic dimensions of global economic change, and globalization’s other effects on local communities. Dicken’s early work focused on the relationships between transnational corporations (TNC) and nation-states, a specific aspect of the “global-local nexus” (Dicken 1994). In Dicken’s view, local communities were relatively powerless in the face of TNC power, unless some unique or scarce resource gave them leverage. For this reason, Dicken believed that virtually all bargaining power lay at the national or supra-national level, and that the prospects of local economies were influenced as much, if not more, by national policies as by local
actions. To Dicken, the overly optimistic view that globalization would automatically bring economic development and well-being to local economies was a serious fallacy.

Dicken’s later research (2007) saw a re-definition of the role of locales and regions in the face of global economic change. He proceeded to examine the three driving forces of changes that impact job and salaries: (1) technological changes, (2) the transnationalization of production, and (3) trade competition from developing countries. The latter has had impacts of the greatest magnitude on developed country workers in production occupations. Without extreme automation (which leads to loss in job numbers), unskilled production operations simply cannot compete with low-wage workforces found in developing or under-developed nations. This occupational group is one of the hardest hit by the forces of globalization.

The literature on linkages between local labor markets and regional economic development follows two strands: (1) that the embedded nature of local economies shape and mediate interaction with global firms, and (2) that the local economy is one of the hardest hit by the forces of globalization.

In this more recent research, Dicken acknowledges the responses of communities, state governments, as either a victim of national agencies that typically use one of the following policy measures to slow global forces, or lighten the impact of globalization on local communities:

7. They “protect” indigenous businesses through regulations against “unfair trade practices” and imposing tariffs on imported goods
8. They attract investment through incentive programs and discourage outsourcing.

9. They develop new technologies (however, this is usually considered “jobless growth” of the local economy).

10. They promote entrepreneurship and small firms (which is also where most job creation occurs).

11. They promote a more “flexible” workforce by increasing pressure and regulation on labor organizations, increase support for state and local employment services, and sponsor vocational training.

Despite such efforts, communities and their civic leaders are faced with the relative immobility of their workforce, as well as the disinclination to perform certain types of work (typically low-wage building and grounds cleaning and maintenance, or even low-wage skilled services such as healthcare support roles) (Dicken 2007).

In contrast to prevailing views at the time, Richard Florida (1996) proposed that the process of economic transformation was not confined to new regions. Instead, using the industrial Midwest as an example, he argued that older manufacturing regions could, and were undergoing economic transformation as a result of measures and actions taken by firms at the local and regional scale in response to globalization of manufacturing. This “creative destruction” of outdated production systems was necessary, Florida argued, and with new organizational techniques, harnessed the intellectual and physical resources of the firm, along with the broader production system.
The literature on the impact of foreign direct investment (FDI) and trade – export trade especially – is an important subset of the globalization impacts theme, and one of particular interest to the topic of this study. Both trade and investment are proxy measures for the growing interconnectedness within the global economy that is a hallmark of increasing global economic interaction. With regard to FDI, the literature includes research that explores the relative few firms that actually engage in international trade, the productivity advantages they embody prior to attempting competition in the international trade arena, and the conclusion that firms that trade differ substantially from those that do not have important consequences for evaluating the gains from trade and their distribution across factors of production (Bernard et al., 2007).

For their part, Glasmeier and Leichenko (1996) emphasized the role of foreign direct investment (FDI) in the economic transformation of the U.S. South in the face of globalization (43 percent of the national total between 1978 and 1996). While Florida acknowledged the role of transplant companies and FDI in the adoption of new forms of manufacturing production organization in the Midwest, he credited individual and clusters of firms with adopting and diffusion new practices in a spatial process new to manufacturing in the region. In contrast, Glasmeier and Leichenko pointed to the strong role of government policies at the national level in the economic transformation of the South. Specifically, infrastructure investments and trade protections made the U.S. South attractive to foreign direct manufacturing production investments, while low investments in education made the South’s relatively unskilled workforce susceptible to trade
liberalization, that is, global economic change (Glasmeier and Leichenko, 1996). In some cases, researchers point to the imbalance between studies of the impacts of FDI on developed (United States) and developing economies (China, India, Mexico), and highlight that inward FDI in developed economies is nearly on par with outward FDI flows (such as the 20 percent difference for U.S. FDI) (Ajaga and Nunnenkamp, 2008; UNCTAD, 2006). While some research findings indicate that FDI has little or no effect in the short run on employment, those findings are in the minority (Liu, 2012). Instead, the literature has numerous studies indicating that FDI has a positive impact on employment and wages. This includes the conclusion that FDI results in increased employment, depending on sector (low in primary, high in manufacturing, ambiguous in service sectors) and that the effects of FDI on local economies vary by state (Alfaro, 2003; Axarloglou and Pournarakis, 2007). Recent research examines the relationship between state level factors and FDI investment: real wages, infrastructure, unionization level, educational attainment, FDI stock, and manufacturing density were found to have a positive impact on inward FDI employment, while gross state product growth rate and real per capita taxes were found have negative impact on FDI employment (Kornecki and Ekanayake, 2013).

In the literature on the effects of global economic trade impacts on employment at local scales, some studies focus on the aggregate impacts of trade on employment, with the rise of external trade leading to “shocks” to the local labor market by resulting in the restructuring of local labor demand and supply, and the migration of labor between
sectors (Gaffard and Saraceno, 2012). Other researchers focus on “heterogeneous” labor (variation in worker skill levels) in the context of international trade, and the competitive advantage of talent dispersion, and the varied responses to trade-induced local labor market conditions by low-skilled and high-skilled workers (Grossman, 2013; DePinto and Michaelis, 2014).

In contrast to selecting case locales or regions as the focus of study, David Angel (2002) highlighted collaborative, analytical exploration as geographers’ greatest potential contribution to the study of global economic change. In his editorial on studying globalization, Angel cited (1) progress in the theoretical framing of the spatial and scalar dynamics of global economic change, and (2) a growing body of region-specific globalization research as the greatest value that geographers could bring to the study of global economic change. Contrasting geographers’ and economists’ approaches, Angel emphasized that the former demonstrate, in an integrated way, how global economic change processes result in “…different, differentiated, and heterogeneous outcomes.” Angel called for greater collaboration among economic geographers, including international research networks, summer institutes and workshops, and project-based websites to extend the analytical theoretical framework he viewed as geographers’ most valuable contribution to the study of globalization.

Michael Storper (2009) has deepened and extended the analysis of globalization’s relationship to regional development and geographic processes at the local scale. Storper focuses on the processes of geographic concentration, fragmentation and trade. He
contests that the “unbundling” of production below the sub-system level to the task level enables a type of fragmentation of the production system where “de-localization” is probable (delocalization is the moving of production at the task level beyond the locale). The implications for local labor structure are significant: if local production is no longer concentrated in a particular locale, fragmentation of the local labor market will mirror delocalization trends. On a more positive note, Storper identifies the benefits to locales and regions of innovation processes. These emerge in specific places and organizational settings, can diffuse to a wider set of places, firms, and uses (but those related in some way to the locale of origin), and thus generate longer-term economic growth for the locale or region. The risk to local labor markets lies in the transition from the former model, where production clusters provided stable and growing employment opportunities related to a particular industry, to a delocalized model where new opportunities for the labor market might be centered around processes (such as the nonexclusive application and recombination of knowledge to reproduce innovation) rather than products (such as industrial production output like solar panels and wind turbine engines).

More recently, researchers have delved more deeply into specific local impacts of global economic change. In her research on the impacts of globalization on textile designers in South Africa, Debby Bonnin articulates the 40-year process by which deregulation of the textile industry and the use of new technologies led to changing distribution channels and integration of the supply chain which enabled designers to interact with manufacturers abroad. The result for the local textile design sub-sector was
that new designers now train in graphic design, rather than specialized textile design, and that they are required to have a broader range of the knowledge and skills – knowledge of manufacturing processes, product development, knowledge of different base cloths, trends, costing, and market needs – in addition to design (Bonnin, 2011). On a more hopeful note, in his examination of mountain communities of Mexico and other parts of Latin America, David Barkin examined the variety of cases where, instead of international economic integration, local communities build on tradition and culture to pursue local development “on the margin” – that is, outside of large-scale international commercial projects. He concludes that traditional communities are finding a way to make indigenous culture a building block for constructing alternative economic alternatives to global integration on a mass scale (Barkin, 2012).

While literature on regional labor markets and trade, wage inequality, or agglomeration economies as impacted by globalization exists (Silva and Leichenko 2004, Wallace 2011), a previous dearth in the literature on its impact on the dynamics and changes in occupational labor structure at local and regional scales is gradually being filled by studies linking local labor market effects to global economic change. Among the first were Sassen’s study of New York, London, and Tokyo, and Marelli’s study of manufacturing in Brescia, Italy (Sassen 2001; Marelli 2006). In the latter, Marelli concluded that foreign direct investment abroad (FDI) did not directly contribute to loss of local labor market jobs, rather had the qualitative effect of upgrading the local workforce by creating a demand in the local market for higher-skilled trades and white-
collar manufacturing jobs at the same time providing work opportunities for immigrants who would perform work that local workers would not pursue (Marelli 2006). Other researchers have studied the phenomena of “shrinking cities” – the outflow of capital, human resources, and thus entrepreneurship and innovation as resources, key infrastructure and intellectual assets concentrate in “global cities” (Martinez-Fernandez 2012).

In a different study, Hany Makhlouf concluded that global labor markets remain unintegrated due in large part to government regulations that typically discouraged labor mobility in order to protect jobs for nationals. An exception is the practice of multinationals that are implementing global human resource strategies that intentionally identify and groom executives, managers and professionals with specialized talents, then deploy them internationally as business needs require. Makhlouf concludes that this practice adds to cultural diversity in these multinational firms and may potentially slowly lead to the integration of the global labor market (Makhlouf 2012).

**Human capital, education and skills in the context of local labor market evolution**

In the fourth strand of literature on globalization and its impacts on local labor markets, the focus is on education and skills in local labor markets. Two main themes emerge: (1) human capital attributes of residents in a particular locale or region (influenced by opportunities, mobility, and migration), and (2) the transition of required skills and development efforts by local governments and educational institutions.
In their study of West German regional labor markets, Felix Büchel and Maarten van Ham (2003) analyzed the relationship between overeducation at the individual level and the availability of employment opportunities. Their central question explored the extent that macro level opportunities (regional market characteristics) and micro level restrictions (commuting and migration tolerance) could help to explain the phenomenon of overeducation. Büchel and van Ham concluded that both distribution of job opportunities and individual spatial flexibility played a role in explaining overeducation, with less overeducation where (1) there was an abundance of jobs (more characteristic of densely-population urban areas), and (2) individual mobility was high. The risk of overeducation was found to be greater the further away from job opportunity abundance (Büchel and van Ham 2003).

John Carruthers and Gordon Mulligan took a different perspective in their work exploring human capital, quality of life and adjustments in metropolitan areas. Analyzing demand-induced growth (driven by economic opportunities) and supply-induced growth (driven by personal preference), Carruthers and Mulligan used econometrics and spatial statistics to test four models:

1. City location and population size (the core model),

2. Core model with industrial composition added (measured by earnings in macro-sectors),
3. Core model with industrial composition and four human capital factors (high-school and college education, per capita number of educational institutions, and per capita public spending on education and libraries), and

4. Core model with industrial composition and four quality of life factors (a natural amenity index, per capita number of entertainment establishments, per capita number of eating and drinking establishments, and per capita public spending on parks and recreation).

Carruthers and Mulligan concluded that growth is bidirectional (both demand and supply driven), and there is a spatial equilibrium between economic opportunities and individual preferences. This equilibrium shifts over very short time periods due to a high level of sensitivity to business cycles and other economic conditions, which researchers can model with sufficient data and policy interest (Carruthers and Mulligan 2007).

While earlier works mention here did not delve into it, migration is the focus of work by Brigitte Waldorf (2009) on human capital accumulation. Waldorf’s research examined the educational levels of immigrants and non-immigrants across 303 United States counties. The results of her analysis indicate that: (1) newcomers are better educated than the resident population, (2) educational gaps are greatest with newcomers from other states, (3) the educational status of newcomers is positively related to the educational status of the resident population. Since an educated “knowledge based” workforce is necessary for successful competition in the global economy, Waldorf
suggests that knowledge agglomeration leading to a community’s sustained human
capital base rests on cultivating an educated resident population (Waldorf 2009).

Shifting to the second theme of research education and skills in local labor
markets, the transition of required skills and development efforts by local governments
and educational institutions, studies by Andrew Agnew et al. (1997) and Ann Markusen
(2004) illustrate the evolution of research focus into skills in industrial and planning (or
public policy) context. In their analysis of computer integrated manufacturing in British
examine the effects of technical change on shop floor workers and supervisors by
analyzing two dimensions of skill: (1) technical complexity and (2) discretion or
autonomy. Due to the transition method chosen by organization management, the result
of implementation was almost Taylor-like, moving from a “make complete” model to a
“stage build” model, where engineering and operations control as opposed to the use of
advanced production technologies. The work previously performed by one operator was
fragmented into a series of repetitive short cycle tasks performed in a pre-planned
sequence, with the pace controlled by the pace of the moving assembly line. The loss of
skill and autonomy by shop floor workers was, in this case, the exact opposite of
accepted modern management theory, which supports the expansion of worker discretion
and creativity through expanding job design (Agnew et al. 1997). Communities (or even
firms) that align themselves with such outmoded and demotivating practices will be hard-
pressed to attract a workforce that will contribute to their sustainability and competitive advantage.

In a markedly different approach, Ann Markusen (2004) advocates bringing occupational targeting into economic development planning as a means to support local labor market workforce availability to high relative employment growth areas, connectivity across industries, fit with underemployed workforce groups, and entrepreneurial potential. In stark contrast to the approach used by the study firm in Agnew et al.’s work, Markusen’s recommendations would enable communities to cultivate flexible labor pools better poised to respond to flexible production shifts that all too often buffet local economies. Using creative and performance arts labor pools as a research focus, Markusen illustrates how community planners could analyze and address occupational needs of community industries: (1) choose key occupations, (2) analyze their location and development, and (3) support public interventions (through funding, policy-making, and other means) to enhance growth and performance of identified occupations (Markusen 2004).

More recently, the work of Daniel Hickman and William Olney examine the impact of globalization on the U.S. domestic market for low-skilled workers, focusing not on employment numbers and wages, but rather on investments in human capital through analysis of higher education enrollments. Using Census data and data from the Integrated Postsecondary Education Data System (IPEDS), Hickman and Olney measure the affect of offshoring and immigration on college enrollments. They conclude that both
offshoring and immigration are related to increases in community college enrollments, but not those of other higher education institutions (Hickman and Olney 2011). In other research, David Neumark, Hans Johnson and Marisol Cuellar Mejia analyzed educational demands on the workforce against the supply of educated workers in the next decade. In contrast to highly publicized cries of skill shortages in the near future, Neumark, Johnson and Cuellar Mejia conclude that there is little likelihood of skill shortages at the national scale through 2020, with the exception of states with large, fast-growing immigrant populations. However they do find that shortages are more likely as the remainder of the baby boomers retire in later years (Neumark, Johnson and Cuellar Mejia 2013).

Labor market policy and alternative responses to global economic change impacts

The literature on labor market policy is the fifth strand of research, and has two themes: first, the underlying theory justifying or supporting the position that labor market policy is (or should be) a local matter, and second, exploring (or questioning) the impacts of local labor market policies that have been put in place. In their seminal work on post-Fordist economies labor markets, Hubert Heinelt (1992), Jamie Peck (1992), and Andrew Jonas (1996), who have demonstrated both the theoretical justification and practical necessity of a local orientation to any labor market policy approach.

Hubert Heinelt (1992) underscored that uniform national systems of income maintenance cannot cover the marginalization risk in the labor market, so financial burdens shift to the local level (specifically, local authorities, welfare organizations, and private households) (Heinelt 1992). He continued to point out that marginalized groups
exist at the local level, and cannot be reached by uniform national policies regarding employment. Heinelt identified four entities in the local political system that are relevant to labor market policy: (1) local authority and municipal politics, (2) local and regional employment offices, (3) state and federal programs (and networks of local political actors carrying out these measures, and (4) intermediate sector members - welfare organizations, faith institutions, business-related programs. Heinelt articulated three types of labor market policy: (1) policy against marginalization, (2) policy and exits from the employment system, and (3) policies aimed at improving workforce qualifications and/or employment opportunities (Heinelt 1992).

Jamie Peck (1992) demonstrated the importance of labor control and social relations in processes of labor market agglomeration, and the role played by local entities in conflicts around workplace discipline and labor reproduction. As he illustrated, the social context of labor markets and labor control strategies informs the question of firm relocation decisions. Peck called for focus on local labor regimes and their social regulation (through policy) to better leverage in situ restructuring by firms, rather than relocation, or “spatial restructuring” as he labels it (Peck 1992).

In his later work, Andrew Jonas (1996) reiterates Peck’s emphasis on the role of local labor frameworks, firm behavior, and social reproduction. He introduces the notion of local labor control regimes: an embedded set of mechanisms that underlie reciprocities between production, work, consumption, and labor reproduction within a local labor market. These regimes are not static and fixed, but are a fluid set of social relations and
power structures that are continuously transformed by forces operating at various scales. Jonas takes the view that placing control of local labor markets on local labor control regimes would lower the social cost of response to a global market while, he states, ensuring production (and capital) over the long term. He calls for analysis of labor control that includes relations of production, consumption and reproduction, but within the context of localized social systems of reproduction, and contests the view of globalization where place is subordinate to space. In fact, giving examples of firms that have elected to remain *in situ* and adapt their social relations in times of crisis, reformulating their relationships with workers, local entities, and other stakeholders, Jonas points out that the benefits of such apparently contrary behavior by firms is that, when firms (capital) become locally involved, they help to cultivate community identities consistent with their own view of positive local economic growth and social stability (Jonas 1996).

The second theme of literature on labor market policy explores the impacts of local labor market policies that have been put in place. In their work examining the impact of education and labor market institutions on unemployment and wage inequality in Europe and the United States, Alicia Adsera and Carles Boix (2000) hypothesized that the distribution of skills is key to explaining the level of the unemployment rate. Acknowledging both structural rationales (trade and technology impacts) and institutional rationales (such as labor policies and collective bargaining patterns), Adsera and Boix examined two institutional regimes: (1) flexible labor market economies, and (2)
economies with socially determined maximum incomes. They concluded that higher skills were strongly related to lower unemployment in both regimes, and that, in the latter, wage coordination agreements between business, unions, and government decrease the adverse impact of higher social wages (taxes) and labor regulation on unemployment (Adsera and Boix 2000).

The success of active labor market policies is the focus of Michael Fertig, Christoph Schmidt, and Hilmar Schneider (2006) in their research into which specific strategies of active labor market policy measures contribute to a significant reduction of unemployment at the level of local labor offices in Germany. Using data from policy mix planning and measures required of local labor offices following the decentralization of active labor market policy in 1998, Fertig, Schmidt, and Schneider analyzed three discretionary measures of employment promotion: (1) human capital formation (promoting the qualification of the unemployed through training), (2) incentive programs (for workers and employers), and (3) job provision. Using spatial regression models to account for regional interactions and regional heterogeneity to isolate the effects of the policy measures, they concluded that two policy measures had the greatest impact on unemployment: (1) training and (2) incentives programs (i.e. wage subsidies) (Fertig, Schmidt, and Schneider 2006).

Finally, shifts in occupational structures and industries in cities of the United States by Hart (1955), research into the transition of firms from “old” to “new” economies by Ettlinger (2008), and globalization impacts on communities both large and
small by Bogart (1999), Collins, and Quark (2006) provide a starting point from which to consider the types, application, and consequences of labor market policy in this study.

*Management theory, business strategy, changing workforce skills, and global business integration*

Management literature describes managerial approaches and assumptions regarding operations, expansion, and the skills and abilities required to support internationalization of the firm. Early management theory focused on increased yields and greater efficiencies in production operations (Taylor1911; Gilbreth (1917). Research in the 1970s and 1980s focused on (1) business strategy, drivers, and dynamics that address the increasingly global business system (Hamel and Prahalad, 1989; 1994), and (2) models used by multinational enterprises to evaluate and implement their activities in an increasingly global business environment – Porter’s five-forces model, value chain framework, and the relative competitiveness of nations, and industries within nations, on a global scale (the Porter Diamond) (Porter: 1979, 1985, 1990). Local labor markets felt the downstream impacts of reengineering, or restructuring as proposed in research by Hammer and Champy (1993), and theories explaining a firm’s ability to gather, analyze, and use information is a necessary requirement for business success in the information age were supported by empirical research by Senge (1990).

In summary, existing literature shows that global economic forces (including FDI and export trade) do have effects on local labor markets, such as FDI in the U.S. South (Glasmeier and Leichenko, 1996). It confirms that skills and capabilities are rooted in
local geographies and change as communities struggle to adjust to globalization of local labor markets, as in the case of South African textile designers (Bonnin, 2011). It also reveals that community responses and strategies to anticipate globalization are emergent, varied, and geographically specific (Marelli 2006).

However, existing literature lacks both insight into the specific nature of the interrelationship of global economic change and local labor markets. It also lacks empirical examples of the effects of globalization factors such as FDI and export trade on specific metropolitan areas. This study fills these gaps in existing literature, as it focuses on the effects of globalization that are specific to a set of metropolitan areas, and it includes analysis of the responses of business and community members to the global economic change they are experiencing in their community, the Denver Metropolitan Region.

Having completed the review of the literature, we now turn to the analysis that is the main focus of this study. The analysis comprises three components:

1. Quantitative analysis of the Denver Metropolitan labor market

2. Comparative analysis of seven selected local labor markets, and

3. Qualitative analysis of the Denver Metropolitan labor market

The chapters that follow provide the results of research and analysis on these three foci of this study.
Chapter 3: Analysis of the Impact of Foreign Direct Investment and International Export Trade on the Denver Metropolitan Labor Market

This chapter contains the first of three analytical components of the research study. The focus of this first analysis is the quantitative evaluation of employment changes by industry in the Denver Metropolitan Region. The chapter begins with an overview of the Denver economy, its historical roots, and how it has been connected to the national and global economy over time. The impact of globalization on economic growth in general, and on specific industries in particular, gives context to employment and globalization impacts during the study period, 1990 to 2010. Efforts by local and regional organizations to attract foreign investment and support increased export trade are summarized and evaluated in light of impacts on local labor markets and sector employment. Regression analysis is used to quantitatively evaluate the accuracy of the hypothesis that FDI and export trade have statistically significant relationship to changes in industry employment in the Denver Metropolitan Region. The data used in the analysis are described and discussed, and the analytical methodology used in conducting the regression analysis is articulated. The results of the analysis are discussed in light of the hypothesis that FDI and export trade are significantly related to industry employment, and conclusions about the implications of the data analysis for efforts by economic development entities synthesize the knowledge gained by this stage of the study.
Background

In 1987, Colorado’s economic development organizations were among the first in the nation to join together to promote economic development in the metropolitan region as a whole, instead of solely their own constituencies. (Metro Denver Economic Development Corporation, 2014) In addition to the Metro Denver Chamber of Commerce, key agencies and organizations included the Metro Denver Economic Development Corporation, the Colorado Competitive Council, the Regional Transportation District, the Scientific and Cultural Facilities District, and the Denver Metro Small Business Development Council (SBDC), a member of the Colorado State SBDC network. Together with state agencies like the Office of Economic Development and International Trade (OEDIT), in 2013, these organizations worked to pass the Advanced Industries Accelerator Programs (HB 13-1001, HB 13-1193). Focusing on six specific industries – advanced manufacturing, aerospace, bioscience, electronics, energy and natural resources (including cleantech), infrastructure engineering, and technology and information – the aim of this legislative program is to:

“…to promote growth and sustainability in these industries by helping drive innovation, accelerate commercialization, encourage public-private partnerships, increase access to early stage capital and create a strong ecosystem that increases the state’s global competitiveness” (OEDIT, 2014).

The program includes two aspects that directly related to supporting business start and excel at export trade: (1) the Advanced Industries Export Grant, that provides stipends to businesses that are new to exporting or expanding into new export markets, and (2) the Global Consultant Network that connects advanced industries to in-country market
research specific to the advanced industry offering under consideration. The Global Consultant Network includes in-country consultants in Brazil, Canada, Mexico, France, Germany, Scandinavia, UK, China and Japan (OEDIT, 2014). In addition to the organizations listed above, the World Trade Center Denver was established in 1987 with the vision of “…Denver and the region as a model global community, linked to the rest of the world by trade, investment, education, culture, transportation and communication” (World Trade Center Denver, 2014). If the number of international businesses that reside in the Denver Metropolitan Region is a sign of success, the activities of these organizations are having positive impact. Shown in Table 2, below, some of these international businesses are:

<table>
<thead>
<tr>
<th>Air Liquide America - France</th>
<th>Holcim Inc. - Switzerland</th>
<th>Siemens - Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arcadis - The Netherlands</td>
<td>Iberdrola Renewables - Spain</td>
<td>SMA - Germany</td>
</tr>
<tr>
<td>Barclays Capitol - United Kingdom</td>
<td>ING America - The Netherlands</td>
<td>Sumitomo - Japan</td>
</tr>
<tr>
<td>Bona U.S. - Sweden</td>
<td>Intermap Technologies - Canada</td>
<td>Suncor - Canada</td>
</tr>
<tr>
<td>BP - United Kingdom</td>
<td>Lafarge North America - France</td>
<td>Swisslog - Switzerland</td>
</tr>
<tr>
<td>Encana - Canada</td>
<td>Novartis - Switzerland</td>
<td>Vestas Wind Systems - Denmark</td>
</tr>
<tr>
<td>Gates Corporation - United Kingdom</td>
<td>Pilatus - Switzerland</td>
<td>Vodafone - United Kingdom</td>
</tr>
<tr>
<td>Great West Life &amp; Annuity - Canada</td>
<td>RICOH/IBM - Japan</td>
<td>Zurich North America - Switzerland</td>
</tr>
</tbody>
</table>

*Table 2: International firms in the Denver MSA, 2014. Source: OEDIT, 2014*

Among the region’s locational factors that make it a desirable place for global business are:

- Same business day (but asynchronous) communication with Europe, South America, and Asia due to the Mountain Time Zone
• At 40° North latitude and 105° West longitude, which enables “one-bounce” real-time (synchronous) satellite connections to six of seven continents, as well as same business day communications with European, Asian and North American trading partners, due to its location approximately mid-way between Frankfurt and Tokyo, as well as its situation between NAFTA partners Canada and Mexico

• Educated workforce, regional cooperation and coordination on economic and business development priorities

• Effective transportation and logistics infrastructure, including national rail connections and Denver International Airport

The increasing focus and maturity of regional organizations’ abilities and commitment to market the region internationally play a significant role in the growth of global business connections and FDI in recent years as well.

The success of the region’s economic development organizations in attracting FDI and supporting export trade by Colorado companies is founded on a regional history of global connections. Colorado’s international history originated with the international trappers and traders who explored and exploited the state first under Spanish, then French rule. Colorado’s explorer population was distinctly multinational between the acquisition of the area by the United States through the Louisiana Purchase of 1803 and the 1858 establishment of St. Charles, Denver’s predecessor and the first lasting settlement on the South Platte River. As mentioned earlier in this study, Denver’s roots as a mining camp
provisioning source made the city and the region around it strongly dependent on regional extractive and agricultural industries for its economic base until fairly recently. The “boom and bust” cycles typical of natural resource-based economies brought eras of plenty and scarcity to the metropolitan area and its residents. This was true first of gold and silver in the late 1800s, and later with oil and gas through the mid-1980s (Leonard & Noel, 1990). The region’s history with mining set the stage for a natural resources industry with international reach. Engineering programs at the region’s higher education institutions attract strong international student populations, and graduates find employment in the many small and large international mining and engineering firms that are globally active and connected. Although successful engineering programs flourish at the University of Colorado and the University of Denver, the premier institution in regard to mining and engineering is the Colorado School of Mines (CSM), known for hard rock and petroleum engineering, as well as materials, environmental, and chemical engineering. Firms operating internationally in this sector benefit from CSM graduates, who quickly find work in regional firms such as CH2M-Hill (a global energy, water, environment and infrastructure consulting, design, build and program management company), Transmontaigne LLC (a terminaling services company, providing product transportation and fuel terminal services through a master limited partnerships), and Summit Mining International, a wholly-owned subsidiary of Japanese parent, Sumitomo Corporation.
In addition to mining, agricultural commerce has long been a staple for the Denver economy. The drive in the early 1900s to develop irrigation infrastructure and increase crop diversification led to a stable food industry throughout the region, along with jobs in the food production and processing industries. As a rail transportation hub serving Chicago and the Mid-West, and eventually California, the West Coast, and beyond, Denver played a vital role in moving mineral and agricultural goods from their areas of production (the mountains in the case of minerals, the plains surrounding Denver in the case of crops, beef and hogs) to mid-west and western markets. Agriculture was not exempt from the boom and bust cycles, and not only due to environmental factors. The shift from beet sugar to cane sugar, from not only Hawaii but also Caribbean and Central American producers in the middle of the last century caused the northern Colorado sugar beet industry to bottom out, with commercial interests in Denver feeling the impact of that shifting market. Although the collapse of industry and mining due to the Great Depression and the decimation of agriculture caused by the Dust Bowl had devastating short-term consequences, these primary sectors recovered in the 1940s. With the growth in post-World War II international interest and collaboration, and the science and technology transfers that characterized the “Green Revolution”, Colorado agriculture gained an international presence beyond its surplus production for export markets. The agricultural programs at Colorado State University formed research partnerships with overseas institutions, supported by both national and international efforts to combat hunger and boost agricultural production, especially in arid environments. Companies
such as Archer Daniels Midland (ADM) and ConAgra grew to international significance during this period, and maintain their global footprint today.

The state’s tourism industry was rooted in initiatives created as part of President Roosevelt’s New Deal, which brought jobs to Denver and Colorado. The Historic American Buildings Survey hired architects and photographers to document historic buildings and inspired the rise of a historic preservation movement in Denver. The Civilian Conservation Corps built trails and campgrounds in Denver's Mountain Parks, laying the ground for future vacationers drawn to the outdoor beauty of the state. The Works Progress Administration built roads, fixed schools and funded artists to decorate government buildings. The new roads and trails encouraged tourism and the stage was set to bring tourists to Colorado through Denver, its transportation hub (Noel, 2013; Colorado Historic Society, 2013). While national visitors were the initial audience for Colorado’s tourism outreach efforts, the impact of international tourism has become a significant economic factor in the Colorado tourism industry. In 2012, direct spending on travel and tourism brought over $16.6 million to the Colorado economy, including directly support over 144,600 jobs with earnings over $4.3 million (Dean Runyan Assoc, 2013). The Colorado Tourism Office (CTO) has an International Promotions Program that markets the state through trade, consumer and media relations, as well as international marketing representatives in Germany, the United Kingdom, France, Mexico, Canada and Japan to market travel and tourism (CTO, 2014). Many of Colorado’s global tourism clientele are skiers served by the state’s ski industry. While
there are European ski travellers when snow conditions on that continent are not favorable, or when the exchange rate makes a ski vacation in the United States worth the cost of travel, a niche market has developed through promoting Colorado to skiers in the southern hemisphere, where the state can attract visitors when it is off-ski-season in Chile and Argentina.

Notable rail improvements include the construction of the Moffat Tunnel in 1928, shortening the distance from Denver to the west coast by 176 miles, and the introduction of the Zephyr by Burlington Railroad in 1934, making the trip from Denver to Chicago only 13 hours – and in luxury that rail travellers had not seen before in the continental United States. As for air transportation, Mayor Benjamin Stapleton’s establishment of the Denver Municipal Airport in 1929 lay the foundation for Denver’s place in international air transport as the airport evolved from derided playground of elite sport aviators to a major commercial flight hub with the growing adoption of pressurized cabins in the mid- and late-1940s, to the non-stop international flight routes available to travellers at Denver International Airport today (Bureau of Land Management, 2013). Non-stop international flights are considered essential to support international business in large metropolitan areas, and Denver is no exception. The recent addition of United Airlines’ non-stop route to Tokyo Narita joins non-stop flights to London, Frankfurt and Reykjavik, as well as numerous non-stop flights to Canada and Mexico. In all, Denver International Airport offers non-stop service to 23 international destinations in nine countries: Germany,
Iceland, the United Kingdom, Canada, Mexico, the Dominican Republic, Costa Rica, Jamaica and Japan (DIA, 2013).

Diversification of the Denver Metropolitan economy started during World War II, when the federal government located several strategic functions in the Denver Ordinance Plant, later known as the Federal Center, to the west of the city limits. The Federal Center was considered a secure location, away from the potentially vulnerable coasts. The Federal presence, and the jobs they brought, continued to grow during the Cold War years, building on existing installations at Fort Logan and Camp George. It soon expanded to include the North American Strategic Air Defense Command (SAC) in Colorado Springs, and two Air Force bases: Lowry and Buckley. The manufacturing infrastructure and federal government jobs made up a growing proportion of the Denver Metropolitan workforce, concentrated in manufacturing and specialized technologies. The existing federal footprint, along with a well-trained workforce drew other federal agencies to Denver and the Front Range, establishing connections with higher education institutions in Denver and Boulder. This trend continued into the present when, in the past two decades, when a diversifying economy spurred job growth in other sectors (Baker, 2004).

The federal presence drew industries that were originally federal contractors, and that have grown into global industries during the last 50 years. This is especially true of the aviation and aerospace industries. Ball Aerospace, Boeing, ITT Exelis, Lockheed Martin, Northrop Grumman, Raytheon, Sierra Nevada Corporation, and United Launch
Alliance are firms that serve as federal contractors. Many also have global operations focused on international clients. The concentration of aviation, space scientists and manufacturing facilities has spurred the growth and globalization of this industry in Colorado, and these firms, in particular.

Economic growth in Denver peaked during the 1970s energy crisis, when oil and gas companies moved into the region to take advantage of the rich energy resources available around the city. Skyscrapers shot up in the downtown Denver area, and also to the southeast as the Denver Tech Center was established to draw and house the thousands of workers necessary to administer and support the oil and gas industry. Especially notable from a support perspective were the legal and administrative jobs associated with land and title operations, required to ensure clear legal ownership of the energy resources being extracted. When the price of oil plummeted from a high of $30 in 1979 to under $10 in the mid-1980s, thousands of oil and gas industry workers lost their jobs. Overbuilding of office space and the exodus of the oil and gas industry led to the highest office vacancy rate (30 percent) in the country (Noel, 2009a).

Some considered reinvestment through bond initiatives during the recession foolhardy, but Mayor Federico Pena’s risky bet paid off. Denver citizens voted in nearly $1 billion bonded indebtedness to fund a new airport (DIA), a new convention center, the Denver Public Schools, a new baseball stadium (Coors Field) and other infrastructure. Working together with surrounding communities to ensure regional cooperation and benefit, Pena partnered to vigorously pursue federal urban development funds to
revitalize the Lower Downtown area, and convinced voters to establish the Scientific and Cultural Facilities District (Noel, 2009b). As Denver and the state emerged from the recession of the 1980s, business and community leaders forged a strong commitment to diversity the economy to move away from heavy reliance on the volatile resource-based economy of the past.

The last two decades have seen a restructuring of the state’s economy, shifting focus to new business ventures in the telecommunications and information technology industries, financial services, and retailing (Murray, 2002). Table 3, below, shows the emerging portfolio of key industries:

<table>
<thead>
<tr>
<th>Advanced Manufacturing</th>
<th>Aerospace</th>
<th>BioScience</th>
</tr>
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<tbody>
<tr>
<td>Creative Industries</td>
<td>Defense &amp; Homeland Security</td>
<td>Electronics</td>
</tr>
<tr>
<td>Energy &amp; Natural Resources</td>
<td>Financial Services</td>
<td>Food &amp; Agriculture</td>
</tr>
<tr>
<td>Health &amp; Wellness</td>
<td>Infrastructure Engineering</td>
<td>Technology &amp; Information</td>
</tr>
<tr>
<td>Tourism &amp; Outdoor Recreation</td>
<td>Transportation &amp; Logistics</td>
<td></td>
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This shift has diversified the regional economy, and shows promise for greater resilience during recessionary cycles, as was demonstrated during the post-9/11 economic slump of 2001-2003 and the recent climb out of the “Great Recession” of 2008-2010. It also positions the Denver Metropolitan region’s workforce for jobs in the economy of the future, not solely focused on past and present occupations and occupational skills.

The efforts by regional and state organizations that have been focused on international development and attracting FDI have led to concrete accomplishments, such as the collaboration to woo United Airlines’ non-stop flight from Denver to Tokyo.
These groups have varying degrees of activity around expanding international economic linkages, and include the World Trade Center Denver (WTCD), the Metro Denver Chamber of Commerce, the Metro Denver Economic Development Corporation (EDC), the Colorado Competitive Council (C3), the Regional Transportation District (RTD), the Scientific and Cultural Facilities District (SCFCD), the Denver Regional Council of Governments (DRCOG), the Colorado Office of Economic Development and International Trade (OEDIT), and the Denver Metro Small Business Development Council (SBDC), a member of the Colorado State SBDC network. These organizations offer a range of resources to businesses currently operating internationally or interested in expanding into global markets. Some examples include:

• International trade and business training programs and networking events (World Trade Center Denver’s World Trade Day annual conference for example)

• Consultation on export start-up, international market analysis, Certificates of Origin, Certificates of Free Sale; access to data (WISERTrade Statistics; A to Z World Trade)

• Export assistance & funding: Advanced Industries Export Grants; Trade education, International Market Analysis Partnership (IMAP), Colorado Trade Mentor; Foreign missions & trade shows, international buyer delegations

• Foreign investor services: Market research, introductions, site searches, business & financial incentives information
• EB-5 Immigrant Investor Program assistance (path to Permanent Residency) for Targeted Employment Area (TEA)

In addition to the resources listed above, the Denver Metropolitan Region benefits from three Foreign Trade Zones (FTZ) near Stapleton, DIA (former WorldPort) and Windsor. The federal government allows businesses located in these areas flexibility in customs duty and formal import requirements, making it possible for manufacturers using imported parts and materials to expedite customs and reduce or eliminate some fees and tariffs.

The roles of business, education, and government in cultivating the economic environment and workforce of the future are vital to a thriving, sustainable economy and workforce. This will be explored later in this study, however now I turn to the data illustrating specific shifts in employment by industry in the Denver Metropolitan area. And, I will test the hypothesis that foreign direct investment (FDI) and international trade are valid proxies for globalization that is driving selected changes in the region’s local labor market and employment structure.

Data

This study uses data from three sources to accomplish two analyses. First, employment data are used to calculate how employment rates in various sectors in the Denver metropolitan region changed from 1990 to 2010. This data was obtained from the Quarterly Census of Employment and Wages (QCEW) conducted by the Bureau of Labor
Statistics (BLS), which is a unit within the U.S. Department of Labor (DOL). Second, foreign direct investment (FDI) and international trade data are used to determine the impact of globalization on employment in specific sectors. FDI data was obtained from the Bureau of Economic Analysis (BEA), and international trade data was obtained from the International Trade Administration (ITA). Both the BEA and the ITA are units within the U.S. Department of Commerce (DOC).

Data in this study are analyzed by industry sector, where possible, and to the finest granularity available. Industry sector classification started in the 1930s with the Standard Industrial Classification (SIC) system, which grouped industry sectors based on the products they manufactured. The manufacturing roots of the SIC system became problematic as the services sector started growing in the 1970s and 1980s. At that time, developments in information services, new forms of health care provision, expansion of services, and high tech manufacturing became examples of industrial changes that the SIC system was not able to integrate effectively, or quickly.

In response, the North American Industry Classification System (NAICS) was adopted in 1997. NAICS grew out of an international partnership between agencies in the U.S. Economic Classification Policy Committee (ECPC), including Office of Management and Budget (OMB), the Bureau of Economic Analysis (BEA), the Bureau of Labor Statistics (BLS), and the U.S. Census Bureau (CB). International partners included Statistics Canada and Mexico’s Instituto Nacional de Estadística, Geografía e Informática.
NAICS classification groups establishments into industries based on the primary activity in which they are engaged. Firms using similar raw material inputs, similar capital equipment, and similar labor are classified in the same industry. NAICS uses a six-digit hierarchical coding system to classify economic activity into 20 industry sectors. Five sectors are mainly goods-producing sectors and 15 are services-producing sectors. The six-digit hierarchical structure allows greater coding flexibility than the four-digit structure of the SIC. NAICS enables the identification of 1,170 industries compared to the 1,004 found in the SIC system. NAICS:

- Established a new Information sector (including communications, publishing, motion picture and sound recording, and online services)
- Restructured the Manufacturing sector to recognize new high-tech industries
- Added a new sub-sector for computers and electronics, including reproduction of software
- Redefined Retail and Wholesale Trade based on how stores conduct business
- Transferred eating and drinking places to a new Accommodation and Food Services sector
- Recognized nine new service sectors and 250 new service industries (Bureau of Labor Statistics, 2014)
NAICS 2012 is the current version of the system, and reclassification of prior data enable industry sector employment by NAICS at the Metropolitan Statistical Area (MSA) level to be analyzed from 1988 forward. For the purpose of this study, employment by NAICS is analyzed in 5-year increments from 1990 to 2010.

The Bureau of Labor Statistics collects, analyses and provides various types of labor-related data as part of its mission. The Quarterly Census of Employment and Wages Program is a cooperative program involving the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor and the State Employment Security Agencies (SESAs). The QCEW program produces a comprehensive tabulation of employment and wage information for workers covered by State unemployment insurance (UI) laws and Federal workers covered by the Unemployment Compensation for Federal Employees (UCFE) program. Files available to the public include data on the number of establishments, monthly employment, and quarterly wages, by NAICS industry, by county, by ownership sector, for the entire United States. These data are aggregated to annual levels, to higher industry levels (NAICS industry groups, sectors, and super sectors), and to higher geographic levels (national, State, and Metropolitan Statistical Area (MSA)).

The QCEW program serves as a near census of monthly employment and quarterly wage information by 6-digit NAICS industry at the national, State, and county levels. At the national level, the QCEW program publishes employment and wage data for nearly every NAICS industry. At the State and area level, the QCEW program
publishes employment and wage data down to the 6-digit NAICS industry level, if disclosure restrictions are met.

This analysis included all NAICS industrial sectors, in order to capture all possible relationships between industry employment changes and the two independent variables, FDI and international trade change. Data on foreign direct investment (FDI) were obtained from the Bureau of Economic Analysis (BEA). BEA is a unit within the Department of Commerce that obtains a wide range of financial and operating data for U.S. affiliates of foreign multinational companies (MNCs). Foreign direct investment is defined as “…the ownership by a foreign investor of 10 percent or more of a U.S. business. The direct investor is known as a foreign parent, and the foreign-owned U.S. business is known as a U.S. affiliate” (Bureau of Economic Analysis, 2014a). According to the BEA, the countries shown in Table 4, below, are the designated ultimate beneficial owners (UBOs) of FDI distributed in PPE in 2011 (Bureau of Economic Analysis, 2014b):

<table>
<thead>
<tr>
<th>Country</th>
<th>FDI in PPE ($mil)</th>
<th>% of total PPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>$37,264</td>
<td>21.02%</td>
</tr>
<tr>
<td>Germany</td>
<td>$26,338</td>
<td>14.86%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>$19,961</td>
<td>11.26%</td>
</tr>
<tr>
<td>Canada</td>
<td>$17,585</td>
<td>9.92%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>$10,434</td>
<td>5.89%</td>
</tr>
<tr>
<td>France</td>
<td>$10,052</td>
<td>5.67%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>$5,047</td>
<td>2.85%</td>
</tr>
<tr>
<td>Other</td>
<td>$50,608</td>
<td>28.55%</td>
</tr>
<tr>
<td>All countries</td>
<td>$177,288</td>
<td>-</td>
</tr>
</tbody>
</table>

*Table 4: Foreign direct investment in U.S. plants, property and equipment, 2011.*
Foreign Direct Investment (FDI) data used for this study were obtained from the BEA’s *Gross Property, Plant, and Equipment (PPE) of Affiliates by State ($millions)* for each of the 5-year periods starting in 1990.

There are two limitations to the FDI data used in this analysis. First, FDI data on PPE were only collected through 2007, rather than through 2010, the final period in this analysis. Absent any other FDI data available for the 2010 observation point, FDI data from the last year available (2007) were used in the analysis for 2010. Second, while the data on industry employment change were at the NAICS sector level, FDI data were only available at the state level. For the analysis of metropolitan areas like Denver, which is the major economic entity in a state, using state-level FDI as proxy for FDI in the study region is a reasonable assumption, and an approach which researchers have taken in past (Ajaga and Nunnenkamp, 2008).

Inspection of FDI investments in PPE rose from 1990 to 2000, declined sharply between 2000 and 2005, then rose again between 2005 and 2007 (Table 5, below). Colorado was the exception to the general decline of PPE investment between 2000 and 2005: during those years, FDI in Colorado rose by a surprising 46.47 percent.

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado</td>
<td>$6,544</td>
<td>31.45%</td>
<td>$8,602</td>
<td>78.09%</td>
<td>$15,319</td>
<td>46.47%</td>
<td>$22,418</td>
<td>59.35%</td>
<td>$35,754</td>
</tr>
<tr>
<td>Georgia</td>
<td>$16,729</td>
<td>34.09%</td>
<td>$22,432</td>
<td>31.55%</td>
<td>$29,510</td>
<td>-19.52%</td>
<td>$23,750</td>
<td>36.98%</td>
<td>$32,532</td>
</tr>
<tr>
<td>Illinois</td>
<td>$23,420</td>
<td>46.48%</td>
<td>$34,305</td>
<td>41.16%</td>
<td>$48,425</td>
<td>-17.79%</td>
<td>$39,809</td>
<td>45.25%</td>
<td>$57,822</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>$8,890</td>
<td>42.94%</td>
<td>$12,707</td>
<td>87.89%</td>
<td>$23,875</td>
<td>-9.95%</td>
<td>$21,500</td>
<td>34.53%</td>
<td>$28,923</td>
</tr>
<tr>
<td>Ohio</td>
<td>$20,549</td>
<td>45.66%</td>
<td>$29,932</td>
<td>25.38%</td>
<td>$37,550</td>
<td>-4.42%</td>
<td>$35,873</td>
<td>47.94%</td>
<td>$53,071</td>
</tr>
<tr>
<td>Tennessee</td>
<td>$10,280</td>
<td>38.39%</td>
<td>$14,227</td>
<td>46.50%</td>
<td>$20,842</td>
<td>-1.08%</td>
<td>$20,616</td>
<td>25.24%</td>
<td>$25,819</td>
</tr>
<tr>
<td>Texas</td>
<td>$57,079</td>
<td>19.38%</td>
<td>$68,142</td>
<td>61.47%</td>
<td>$110,032</td>
<td>-21.59%</td>
<td>$86,280</td>
<td>69.86%</td>
<td>$146,554</td>
</tr>
<tr>
<td>US Total</td>
<td>$578,355</td>
<td>33.05%</td>
<td>$769,491</td>
<td>52.78%</td>
<td>$1,175,628</td>
<td>-6.11%</td>
<td>$1,103,766</td>
<td>38.62%</td>
<td>$1,530,053</td>
</tr>
</tbody>
</table>

*Table 5: Inward foreign direct investment (FDI), selected states, 1990 to 2007.*
International Trade data were obtained from the International Trade Administration’s *Trade Stats Express* online data retrieval tool (International Trade Administration, 2014). The International Trade Administration (ITA) is a unit within the Department of Commerce, and data were provided through the ITA’s Office of Trade Policy and Analysis (OTP&A), that provides data, analysis, and recommendations on policy, and trade promotion issues affecting global U.S. industry competitiveness. ITA provides international trade data by state and by NAICS, or by Metropolitan Statistical Area (MSA) and by NAICS (from 2005 forward).

The limitation to ITA international trade data is its availability for the complete period of this study, and the aggregate level for which it is available. Trade data were available by state and by NAICS only from 1999 forward, so data on trade by NAICS were used for analysis of industry employment changes from 2000 to 2010. However, aggregate trade data were available for 1995, at the level of Manufactured and Non-Manufactured Goods, so that data were used for analysis of international trade impact on industry employment between 1995 and 2000. Trade data at the MSA level were only available from 2005 forward. A separate analysis was run on this time period, in order to further the analysis of international trade as an independent variable correlated to industry employment. There were no trade data at the either the state or MSA level available for 1990, so the 1990 to 1995 period was not included in the analysis.

The rebound of international trade in Colorado after the economic downturn of 2008-2010 is evident, as shown in Table 6, below. Between 2005 and 2010, trade
increase dramatically in Oil and Gas (322 percent), Mineral Resources (168 percent), Textile Mills Products (203 percent), Waste and Scrap (272 percent), and Used or Second-Hand Merchandise (180 percent). Whether or not the amount of international trade was correlated to changes in industry employment is the focus of the analysis section of this chapter.

Table 6: Employment change for selected industries, 2000 to 2010.

Having described the sources, types and limitations of the data analyzed for this study, we now move on to the analytical methodology and results of the analysis.

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Analytical Methodology

The analytical approach taken in this study included two major components. First, changes to Denver Metropolitan employment by industry sector provided a general understanding of employment trends between 1990 and 2010. Second, the impact of global economic change on employment in specific industry sectors was assessed using regression analysis to determine the effects of two independent variables representing globalization forces on employment in the industry sectors that are the focus of this study. Because the data reflect actual employment numbers, not a sample of the workforce, descriptive statics and regression analysis are applied to the data, rather than using inferential statistical approaches, as would be appropriate for sample data.

To provide a general understanding of employment trends in the Denver Metropolitan region, employment for the selected industry sectors was analyzed to determine trends in employment patterns in 5-year increments between 1990 and 2010. First, industry employment levels were examined at all NAICS levels (2- to 6-digits) and the percentage increase or decrease between periods was calculated. This broad approach was chosen to ensure that significant changes in sub-sector employment were not overlooked in the analysis. Next, analytical thresholds were determined, selecting for only those industry sectors or sub-sectors with employment levels greater than 1,000 in any of the 5-year periods. This removed any sub-sectors with very low employment levels or very small percentage changes in employment from further analysis. The remaining employment sectors were examined the next stage of analysis.
The purpose of the second stage of analysis was to assess differentiation in the impacts of FDI and international trade on sector employment in the Denver Metropolitan area. FDI and international trade were selected as proxy measures for global economic change drivers that were expected to impact employment in selected industry sectors. These measures were selected because data for alternatives, such as foreign ownership of business establishments or employment by foreign-owned affiliates, are either inconsistent or unavailable for the period covered in this study. Future approaches that seek to include such factors in industry employment analysis may build on the results of this study, but are beyond the scope of the work at hand. Because FDI and international trade data were available at the 3-digit NAICS level, the next stage of evaluation used 3-digit NAICS employment data in the analysis.

Regression analysis was used to measure the impact of global economic change on employment in specific industry sectors. Regression analysis predicts the behavior of a dependent variable, \( y \), by an independent variable, \( x \). In this study, the dependent variable was the percentage change in industry sector employment, and the two independent variables were the percentage change in FDI and international trade. The analysis was conducted for each 5-year period, starting with 1995 for FDI (based on change between 1990 and 1995), and starting with 2000 for international trade (based on change between 1995 and 2000). Both analyses were run through 2010.\(^5\) Because there

\(^5\) FDI data was available for 1990, making it possible to run the regression analysis against industry employment change from 1990 to 2010. International trade data was only available at the level of analysis conducted starting in 1995. So, the regression analysis with international trade was only conducted for industry employment changes starting in 1995.
were two independent variables, regression was run on each variable independently. The two variables were checked for multicollinearity before multiple regression analysis was conducted to predict \( y \), industry sector employment. The regression equation used was \( Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \epsilon \).

The analytical methods described above formed the basis from which to answer the fundamental question of whether the Denver Metropolitan area has experienced changes in industry sector employment due to global economic change factors, and to what degree.

**Analysis and Results**

Denver Metropolitan Statistical Area (MSA) employment trends at the aggregate, Domain and Super sector NAICS level for the selected industry sectors align with major economic trends experienced in the past 50 years. The growth of the service sector, compared to goods-producing industry (manufacturing in particular) is evident in the proportion of industry employment the two represent in the Denver Metropolitan Region’s labor market (Table 7, below).

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Goods-Producing</td>
<td>17.13%</td>
<td>16.75%</td>
<td>17.64%</td>
<td>16.29%</td>
<td>13.27%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>10.92%</td>
<td>9.23%</td>
<td>8.18%</td>
<td>7.15%</td>
<td>6.13%</td>
</tr>
<tr>
<td>Other Goods-Producing</td>
<td>6.21%</td>
<td>7.52%</td>
<td>9.46%</td>
<td>9.13%</td>
<td>7.15%</td>
</tr>
<tr>
<td>Service-Producing</td>
<td>82.87%</td>
<td>83.25%</td>
<td>82.36%</td>
<td>83.71%</td>
<td>86.73%</td>
</tr>
<tr>
<td>Trade, Transportation, and Utilities</td>
<td>24.89%</td>
<td>24.76%</td>
<td>23.42%</td>
<td>23.20%</td>
<td>22.63%</td>
</tr>
<tr>
<td>Professional and Business Services</td>
<td>17.51%</td>
<td>18.33%</td>
<td>18.74%</td>
<td>18.99%</td>
<td>20.35%</td>
</tr>
<tr>
<td>Leisure and Hospitality</td>
<td>11.82%</td>
<td>11.48%</td>
<td>10.96%</td>
<td>12.00%</td>
<td>12.75%</td>
</tr>
<tr>
<td>Other Service-Producing</td>
<td>28.65%</td>
<td>28.67%</td>
<td>29.24%</td>
<td>29.52%</td>
<td>30.98%</td>
</tr>
</tbody>
</table>

*Table 7: Employment change by major industry sector, Denver MSA, 1990 to 2010.*
Between 1990 and 2000, economic growth at the national level was mirrored in industry employment trends in the Denver MSA. Employment growth reached an overall peak of more than 23 percent between 1995 and 2000, with professional and business services and goods-producing employment reaching nearly 26 percent and 30 percent, respectively, during the same period (Table 8, below).

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Total, all industries</td>
<td>704,349</td>
<td>833,069</td>
<td>1,025,230</td>
<td>1,011,552</td>
<td>998,239</td>
</tr>
<tr>
<td>Goods-Producing</td>
<td>120,681</td>
<td>139,512</td>
<td>180,897</td>
<td>132,513</td>
<td>124,733</td>
</tr>
<tr>
<td>Service-Providing</td>
<td>583,668</td>
<td>693,557</td>
<td>844,333</td>
<td>865,725</td>
<td>873,506</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>76,949</td>
<td>76,873</td>
<td>83,213</td>
<td>81,518</td>
<td>71,568</td>
</tr>
<tr>
<td>Trade, Transportation, and Utilities</td>
<td>175,285</td>
<td>206,303</td>
<td>240,105</td>
<td>225,927</td>
<td>225,927</td>
</tr>
<tr>
<td>Professional and Business Services</td>
<td>123,314</td>
<td>152,733</td>
<td>192,137</td>
<td>203,183</td>
<td>203,183</td>
</tr>
<tr>
<td>Leisure and Hospitality</td>
<td>83,279</td>
<td>95,642</td>
<td>112,316</td>
<td>121,404</td>
<td>127,314</td>
</tr>
</tbody>
</table>

Table 8: Employment totals and change by major industry sector, MSA 1990 to 2010.

The growth of the 1990 to 2000 period was sharply reversed in the two economic downturns of the recent decade. Like the rest of the country, the Denver MSA was hit by the so-called “dot-com bubble burst” that started in 2000, followed by the post-9/11 recession, and in the “great recession” of 2008-2009, all mentioned earlier in this study. The highest levels of 4-digit NAICS level industry employment in the sectors identified for this study were reached in 2000 by jobs in employment services (for the most part temporary agency workers), wired telecommunications carriers (before the ubiquitous presence of wireless communications), and scheduled air services (a boutique niche for the business traveler with disposable income – another relic of the waning dot-com era).

The percentage change between 5-year periods during the two decades covered by this study show the volatility of the industry employment structure in the Denver Metro Region. Change in employment for the wireless communications industry reached the highest increase between 1995 and 2000, and then plunged dramatically in 2005, and
only gradually regained ground leading into 2010. Jobs in software publishing and magnetic media also plunged to lows in 2005, reflecting the continuing repercussions of the dot-com bubble burst on those industry sectors.

The overall trend of industry sector employment over the two decades illustrates that, in spite of the explosive technology-fueled economic growth that careened just past 2000, industry employment as a whole had already started declining in 1995. The marked plunge in overall employment change percentages to lows between 2000 and 2005 indicate the depths from which employment levels had sunk when the “great recession” of 2008-2010 struck, as shown in Figure 5, below.

![Figure 5: Average percent change in Denver MSA employment, all industries, five-year increments](image)

By 2010, industry employment had nearly recovered the levels attained in 2000. Examination of the proportion of goods- and services-producing employment shows that
the balance between the two major domains remained relatively steady, with goods-producing employment dropping only 4 percent between 1990 and 2010, and services-producing employment increasing by approximately the same amount during that period.

Increasing global economic change in the past two decades has taken place against this backdrop of Denver MSA industry employment. The lowering value of the U.S. dollar, the strong communications and transportation infrastructure, a highly educated workforce and entrepreneurial culture are all factors that likely made doing business in the U.S. more attractive to foreign-owned enterprises from 1990 forward. This study uses proxy measures of changes in foreign direct investment (FDI) and international trade to explore the impact of two globalization factors on changes in industry employment in the Denver MSA.

Exploratory analysis was performed before running the regression analysis. First, analysis of the distribution of the Employment Change, FDI Change and International Trade (Export) Change was run. Change in industry employment is normally distributed, as expected, since the data represent the total population employed in the selected sectors in each of the 5-year periods under analysis. The change in FDI is not normally distributed, and shows the distinct pattern of the state-level data available for each of the 5-year periods. International trade data are also not normally distributed, as the selected industry sectors do not represent the full population of sectors that conduct international trade (Figure 6 below).
Regression that fits industry employment change (\(Y\)) by FDI change (\(X_1\)) and international export trade change (\(X_2\)) renders the results shown in Figure 7, below:
Figure 7: Multiple regression of Industry Employment ($y$) by FDI ($x_1$) and International Export Trade ($x_2$)

To confirm that the two independent variables were independent of each other, the Variance Inflation Factor (VIF) for each variable was calculated to test for multicollinearity. VIF values > 10 indicate a problem with inter-dependence, however the VIF values for both FDI and International Export Trade were both VIF = 1, demonstrating no relationship. With this in mind, further examination of the validity of the regression model was conducted.
The prediction equation and parameter estimates for FDI change against industry employment change indicate that employment change will decrease by -0.024334 when FDI increases by 1 unit. Several output statistics indicate the weak relationship between FDI and employment changes: The R-square that is so small it does not display as a standard number, and p-value (0.8797) is greater than the 0.05 significance threshold. These factors indicate the relationship of FDI to the dependent variable industry employment is statistically immaterial (“no relationship”). The normal residual quantile plot indicates that normality assumptions are correct, as shown in Figure 8, below.

![Residual Normal Quantile Plot](image)

*Figure 8: FDI normal residual quantile plot*

As for international trade, the regression analysis indicates that industry employment change will increase by 0.318584 when international trade change increases by 1 unit. Although the relationship is not very strong, it is slightly stronger than for FDI. The R-square that is 0.0856 indicates a very weak relationship, the F Ratio (7.4047) is much larger than the 0.05 significance threshold, and the P value (0.0080) is also above the significance threshold. These results are not unexpected since the analysis was applied to the all selected industry data parameters. Here, too, the normal residual quantile plot indicates that normality assumptions are correct (Figure 9, below).
While the regression analysis above was performed as a bivariate analysis, including both FDI (Figure 10) and International Export Trade (Figure 11), the statistics were similar when each independent variable was run separately against industry employment data:
Figure 10: Regression analysis, FDI
Figure 11: Regression analysis, International export trade

Testing for non-linear model fit yielded slightly improved R-square values, indicating a better fit of the data with the model, as shown in Figure 12, below. With the quadratic model, the R-square value of FDI increased from extremely small to 0.1906, and with the cubic model, the R-square value International Export Trade increased from 0.0856 (linear) to 0.1256.
Figure 12: Regression analysis R-squares, linear and polynomial (quadratic and cubic)

F-ratios indicate the likelihood that the relationship between dependent and independent variables is not random. These values were much larger for FDI in the quadratic and cubic models, rising from 0.0229 in the linear model, to 46.7434 in the quadratic model and 31.7669 in the cubic model. In contrast F-values for International Export Trade declined from 7.4047 in the linear model to 3.6739 and 3.6855 in the quadratic and cubic models, respectively. The p-value is the probability of rejecting the null hypothesis that there is no relationship between the dependent and independent values. In the case of FDI, the p-value (same as Prob > F below) decreased from 0.8797 to <0.0001 in both the quadratic and cubic models. This indicates the greater significance of these non-linear models in describing the relationship between FDI and Industry Employment. In the case of International Export Trade, however, p-values did not
become any more significant in the non-linear models, increasing to 0.0299 and 0.0155 in the quadratic and cubic models, respectively (Figure 13, below).

![Regression analysis of variance, linear and polynomial (quadratic and cubic)](image)

In spite of the low aggregate explanatory power of the two independent variables, regression analysis applied to specific sectors illustrated the more subtle effects of FDI and international trade change on employment change, as was the intent of this study.

Results of a Fit Y by X regression analysis of the full dataset of Denver MSA industry employment change data indicated that only four of the selected industry sectors have p-values less than 0.10 indicating a 90 percent chance that there is a real (statistically significant) relationship between employment change and change in FDI or international trade (Table 9, below). According to the regression model, R-square analysis shows that change in international trade explains 33.9 percent of employment
changes in Transportation Equipment Manufacturing, with every 1 percent increase in trade predicting 1.27 percent increase in employment. International trade change also explains 12.4 percent of employment changes in Computer Electronic Manufacturing, with every 1 percent increase predicting a .40 percent increase in sector employment.

As for the impact of FDI, the analysis indicates that change in FDI explains 86.8 percent of employment changes in Pipeline Transportation, with every 1 percent increase in FDI predicting 6.61 percent increase in employment. FDI also explains 52.8 percent of employment changes in Data Processing and Hosting Services, where every 1 percent increase in FDI predicts 1.93 percent increase in sector employment.

<table>
<thead>
<tr>
<th>Sector</th>
<th>X</th>
<th>RSquare</th>
<th>F Ratio</th>
<th>Prob &gt; F</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trans Equip Mfg-336</td>
<td>Intl Trade chg</td>
<td>0.3391</td>
<td>9.7487</td>
<td>0.0056</td>
<td>1.2692</td>
</tr>
<tr>
<td>Computer Electronic Mfg-334</td>
<td>Intl Trade chg</td>
<td>0.1237</td>
<td>4.8002</td>
<td>0.0354</td>
<td>0.4027</td>
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<td>Data Processing Hosting Svcs-518</td>
<td>FDI Change</td>
<td>0.5282</td>
<td>6.7186</td>
<td>0.0411</td>
<td>1.9285</td>
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<tr>
<td>Pipeline Trans-486</td>
<td>FDI Change</td>
<td>0.8688</td>
<td>13.2409</td>
<td>0.0629</td>
<td>6.6052</td>
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<tr>
<td>Trans Support-488</td>
<td>FDI Change</td>
<td>0.1245</td>
<td>3.1285</td>
<td>0.0908</td>
<td>-1.0508</td>
</tr>
<tr>
<td>Couriers &amp; Messengers-492</td>
<td>FDI Change</td>
<td>0.1944</td>
<td>2.4137</td>
<td>0.1513</td>
<td>-0.9274</td>
</tr>
<tr>
<td>Truck Trans-484</td>
<td>FDI Change</td>
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<td>1.8269</td>
<td>0.1866</td>
<td>-0.2565</td>
</tr>
<tr>
<td>Telecommunications-517</td>
<td>FDI Change</td>
<td>0.1648</td>
<td>1.9732</td>
<td>0.1904</td>
<td>1.9149</td>
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<tr>
<td>Publishing x Internet-511</td>
<td>Intl Trade chg</td>
<td>0.1219</td>
<td>1.8044</td>
<td>0.2022</td>
<td>0.1956</td>
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<tr>
<td>Securities Commodities Fin Instruments-523</td>
<td>FDI Change</td>
<td>0.0541</td>
<td>1.2595</td>
<td>0.2738</td>
<td>0.8057</td>
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<tr>
<td>Computer Electronic Mfg-334</td>
<td>FDI Change</td>
<td>0.0214</td>
<td>1.0046</td>
<td>0.3214</td>
<td>-0.5692</td>
</tr>
<tr>
<td>Trans Equip Mfg-336</td>
<td>FDI Change</td>
<td>0.0343</td>
<td>0.9234</td>
<td>0.3454</td>
<td>0.3740</td>
</tr>
<tr>
<td>Credit Intermediation-522</td>
<td>FDI Change</td>
<td>0.0311</td>
<td>0.5768</td>
<td>0.4574</td>
<td>-0.7040</td>
</tr>
<tr>
<td>Electrical Equip Appliance Mfg-335</td>
<td>Intl Trade chg</td>
<td>0.0720</td>
<td>0.5432</td>
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<td>Air Trans-481</td>
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<td>Insurance Carriers-524</td>
<td>FDI Change</td>
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<td>0.4303</td>
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</tr>
<tr>
<td>Electrical Equip Appliance Mfg-335</td>
<td>FDI Change</td>
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<td>0.3618</td>
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<td>-0.8815</td>
</tr>
<tr>
<td>Funds Trusts-525</td>
<td>FDI Change</td>
<td>0.1497</td>
<td>0.3521</td>
<td>0.6131</td>
<td>-1.1154</td>
</tr>
<tr>
<td>Admin Support-561</td>
<td>FDI Change</td>
<td>0.0003</td>
<td>0.0296</td>
<td>0.8637</td>
<td>-0.0529</td>
</tr>
</tbody>
</table>

Table 9: Change in employment due to FDI (x₁) and International Export Trade (x₃).

**Discussion**

While there has been quite extensive growth of both FDI and international trade between in the past 20 years, the regression analysis performed as part of this study clearly suggests that, in the Denver MSA, these two factors are correlated with very
specific industry employment growth. FDI in Colorado’s rich oil and gas resource industry is evident in foreign-owned companies who employ Colorado workers, such as EnCana Oil & Gas Inc. (Canadian), Arcadis U.S. Inc (The Netherlands), Gates Corporation (Canada), and Maptek (UK) (Denver Business Journal, 2014). Affiliates of non-U.S. firms are often linked to firms such as Transmontaigne, which builds transmission pipelines to carry petroleum-based and mineral-based resources to U.S. port and air distribution facilities and beyond, and the PanAlpina Group, a global supply chain company offering air/ocean freight and logistics solutions.

The ascendance of Computer and Electronic Manufacturing during the 1990 – 2010 period reflects the business experience of several key industries within the region. In the 1990s Storage Technology was a leading firm in the region’s computer manufacturing industry. As digital technologies expanded through both the business and commercial electronics sectors, the need to store digital data provided lucrative markets for Storage Tek’s server products. Other firms located in the region specialized in complementary technologies: Level 3 (network management and security), U.S. West Advanced Technologies (a Bell Labs spin-off from the Bell system divestiture), Ball Technologies, Seagate, and Amgen, to name a few. The burgeoning cable, then satellite television businesses in the region also contributed to the 1990s growth in Computer and Electronic Manufacturing, with Jones Intercable as an early entrant, TCI, Dish, Echostar and later Comcast. More recently, the relocation of Arrow Electronics’ national headquarters to the Denver Metro Region signals the continued influence of these
industries on the regional economy. Without exception, these early entrants into the technology field now operate internationally, and are likely contributors to the results showing increased international export trade (service sector) and also FDI (attracting investment into their U.S. operations).

There are several reasons that FDI and trade may have little impact on employment levels beyond the specific cases described above. First, investment (FDI) may be in financial or technology sectors, which are typically less labor-intensive than traditional production operations. Even for industries such as Computer and Electronics Manufacturing, in which international trade shows a correlation to employment, jobs in the Denver Metro Region are likely to involve work by managers and analysts, not people in production jobs, which are most likely in offshore manufacturing facilities due to labor costs. As for the Finance and Insurance sectors, Denver is no New York, with its historic and close ties European and Middle-East business activities, nor a San Francisco or Seattle, which both are well situated to interact with Asian financial centers. Although international trade is increasing for businesses in the Denver Metropolitan Region, it is not at the same level as financial transactions with regionally based companies, especially those in strong Front-Range telecommunications, call center, and resource administration sectors.

**Conclusion**

With the focused efforts of the state Office of Economic Development and International Trade (OEDIT) and other regional economic development entities currently
underway, international trade by businesses in the Denver Metropolitan region is likely to continue to grow, and community leaders will continue their efforts to attract national and international businesses to invest in or relocate to the region. The educated workforce that companies require, along with advanced and sustainable transportation and communications infrastructure will be vital to the region’s continuing ability to attract new and growing businesses in both traditional and emerging industries.

Not only must the Denver Metropolitan region tend to economic conditions locally, but it must also compete with other metropolitan areas across the country that seek economic growth and trade as well. Competition for foreign direct investment, and efforts to develop goods and services aimed at international destinations is a nascent, but growing activity in most metropolitan areas across the United States. The next section in this study compares the Denver Metropolitan area with six other metropolitan areas, including the extent of FDI and international trade change effects on industry employment levels in those regions.
Chapter 4: Analysis of the Impact of Foreign Direct Investment and International Export Trade on Seven Metropolitan Labor Markets

This chapter contains the second of three analytical components of the research study. The focus of this second analysis is a comparative quantitative study of employment changes by industry in seven different geographic locations over a twenty-year period. The seven locations – Denver, Atlanta, Chicago, San Antonio, Chattanooga, Boston, and Cleveland – are exemplars from a new taxonomy of urban classification based on changing urban demographic patterns that emerged through analysis of the most recent census (Brookings Institution, 2010). The chapter begins with an overview of the typology used as the basis for the seven metropolitan areas selected for the comparison. The historical and contemporary growth of industries in each of these metropolitan areas, along with insight into how globalization has been affecting them during the 1990 to 2010 study period follows. Industry employment in 5-year increments from 1990 to 2010 for each city is analyzed to identify trends by major sector. Next, regression analyses of foreign direct investment and international trade as independent variables form the basis for evaluation of the hypothesis that FDI and export trade have statistically significant relationship to changes in industry employment in selected industries in these communities. Finally, the chapter ends with a discussion of the implications of the regression findings for the hypothesis that FDI and international export trade influence local labor market.
Background

The past three decades have seen a significant shift in the dynamics of global economic change that affect national and local economies, and a similar substantial change the demographic attributes of the United States’ largest metropolitan areas. The nature and processes of these two forces are different, but have a significant impact on local labor markets and the ability of employers to meet their workforce needs. This chapter identifies and analyzed employment trends between 1990 and 2010 for seven metropolitan areas.

The seven metropolitan areas that are the focus of this analysis collectively represent the new seven-category typology of metropolitan America articulated in a recent Brookings Institution report (Brookings Institution, 2010). The report highlights five “new realities” that emerge from analysis of demographic change between the 2000 and 2010 Census. These five realities are:

1. Continued growth and outward expansion of our population
2. Ongoing racial and ethnic diversification
3. The “rapid” aging we are about to undergo
4. Increasing but selective higher educational attainment
5. Intensified income polarization experienced by workers and families

The report categorizes the nation’s largest 100 metropolitan areas into seven types, based on three different levels of population growth, population diversity, and educational attainment (low, medium, and high). Table 10, below, depicts the
demographic dimensions the Brookings researchers attribute to each of the seven metrotypologies.

The Brookings approach builds upon previous research into classification and comparison of American cities by Nelson (1955), and Archer and White (1985). These researchers were interested in the ways that variations in urban economic specialization reflect difference in geographical location, settlement form, population size, and standard of living. The researchers at The Brookings Institution conceive of metropolitan regions as the rising engines of economic activity – they see metropolitan areas as hubs for innovation, production, trade and investment within countries and across international borders. Their current research focuses on how metropolitan areas are engaging in the world markets to create more jobs, attract global talent and investment, and spur long-term, sustainable economic growth. Following the most recent census, their in-depth analysis yielded a new perspective on the categorization of metropolitan areas: seven

<table>
<thead>
<tr>
<th>Metro Type</th>
<th>Number of Metro Areas</th>
<th>Total Population (millions) 2000</th>
<th>% Growth in Core Areas, 2000 to 2008*</th>
<th>% Population Age 45 and Over</th>
<th>% Population Foreign-Born</th>
<th>Educational Inequality Ratio**</th>
<th>Wage Inequality Ratio***</th>
<th>% Commuters Driving Alone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diverse Giant</td>
<td>9</td>
<td>38</td>
<td>20</td>
<td>26</td>
<td>2.6</td>
<td>5.7</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Skilled Anchor</td>
<td>10</td>
<td>31</td>
<td>n/a</td>
<td>41</td>
<td>6.1</td>
<td>4.6</td>
<td>77</td>
<td>77</td>
</tr>
<tr>
<td>Next Frontier</td>
<td>9</td>
<td>23</td>
<td>35</td>
<td>18</td>
<td>2.6</td>
<td>6.4</td>
<td>74</td>
<td>74</td>
</tr>
<tr>
<td>New Heartland</td>
<td>19</td>
<td>28</td>
<td>44</td>
<td>9</td>
<td>2.0</td>
<td>4.7</td>
<td>79</td>
<td>79</td>
</tr>
<tr>
<td>Industrial Core</td>
<td>18</td>
<td>22</td>
<td>n/a</td>
<td>40</td>
<td>2.1</td>
<td>4.5</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td>Border Growth</td>
<td>11</td>
<td>19</td>
<td>30</td>
<td>33</td>
<td>2.9</td>
<td>4.9</td>
<td>77</td>
<td>77</td>
</tr>
<tr>
<td>Mid-Sized Magnet</td>
<td>15</td>
<td>13</td>
<td>23</td>
<td>41</td>
<td>6.2</td>
<td>4.5</td>
<td>81</td>
<td>81</td>
</tr>
</tbody>
</table>

100-metro average: 100 33 16 2.4 5 74

Table 10: Seven types of large metropolitan areas.
demographic typologies, based on three factors: population growth, population diversity, and educational attainment levels. For the purpose of this study, a metropolitan area from each category was selected.

Population growth, population diversity, and educational attainment levels are the foundation for the Brookings report metro area categorization into the seven metro types:

1. **Next Frontier** metro areas like Denver exceed national averages on population growth, diversity, and educational attainment. Of these nine metro areas, eight lie west of the Mississippi river (Washington, D.C. is the exception). They attracted immigrants, families, and educated workers during the 2000s thanks to their diversified economies (including government employment in several) and relatively mild climates. In some ways the demographic success stories of the 2000s, Next Frontier areas are generally younger, growing more densely, and more transit-oriented than other metro areas. Their inhabitants may experience higher levels of both educational and wage inequality than in other metro areas.

2. **New Heartland** metro areas are also fast growing, and highly educated, but have lower shares of Hispanic and Asian populations than the national average. These 19 metro areas include many in the “new South” where blacks are the dominant minority group, such as Atlanta, Charlotte, and Richmond, as well as largely white metro areas throughout the Midwest and West, such as Indianapolis, Kansas City, and Portland. The service-based economies of these metro areas attracted many middle-class migrants, both white and black, during the 2000s. That diverse in-migration has given
the new heartland areas a more racially equitable educational profile than other metropolitan types.

3. **Diverse Giants** feature some of the largest metro areas in the country, including the three largest (New York, Los Angeles, and Chicago), as well as coastal anchors such as Miami, San Francisco, and San Diego. These nine regions exhibit above-average educational attainment and diversity, but below-average population growth, owing in part to their large sizes. Like the New Frontier areas, they are growing more densely, but exhibit wide educational and wage disparities. With more than one-quarter of their residents born abroad, these areas are home to sizeable populations of “second-generation” children of immigrant parents.

4. **Border Growth** metro areas like San Antonio are mostly located in southwestern Border States, and as such are marked by a significant and growing presence of Mexican and other Latin American immigrants. Only Orlando lies outside the main extent of this group of 11, which stretches from central Texas, through Arizona and Nevada, and up California’s Central Valley. Many of these metro areas are suffering “migration whiplash,” as they built large swaths of single-family housing for tens of thousands of newcomers through mid-decade, only to see growth largely halt with the bursting of the housing bubble. For those workers and families that stayed, especially less-skilled Hispanics, the challenge now before these areas is to diversify the local economy in ways that provide sustainable growth opportunities well beyond the housing sector.
5. **Mid-Sized Magnet** metro areas like Chattanooga are similar in their recent growth and educational profile to border growth centers, but are distinguished by lower shares of Hispanic and Asian minorities. These 15 mostly mid-sized locations, largely in the Southeast but with some Western representatives, lack some of the high-value industries that characterize the new heartland. Similar to the border growth centers, some got caught in the growth spiral of the 2000s that ended abruptly with the housing crash – particularly Boise and the six Florida metro areas. Having attracted many boomers and seniors over time, Mid-Sized Magnets contain the oldest populations among the metropolitan types, but have grown in a distended fashion that has left them among the most car-dependent of the seven groups.

6. **Skilled Anchors** are slow growing, less diverse metro areas that boast higher-than-average levels of educational attainment. Seventeen of the 19 lie in the northeast and Midwest, and include large regions such as Boston and Philadelphia, as well as smaller regions such as Akron and Worcester. Many are former manufacturing and port centers that some time ago made the difficult transition to service-based economies, with significant representation of medical and higher educational institutions. Others like Pittsburgh and St. Louis still specialize in non-auto-related manufacturing sectors that remained relatively steady over the 2000s. These characteristics have kept Skilled Anchors demographically more vibrant than other parts of the north, even as they exhibit lower levels of inequality than faster-growing
metros. All of the modest recent growth across these areas has occurred in lower-density suburbs.

7. **Industrial Cores** like Cleveland are in some ways the most demographically disadvantaged of the metropolitan types. These 18 metro areas are largely older industrial centers of the northeast, Midwest, and Southeast. Their populations are slower growing, less diverse, and less educated than national averages, and significantly older than the large metropolitan average. A remaining industrial base combined with lack of diverse in-migration to these metro areas has kept educational and wage inequalities in check. But these metropolitan areas lost population in the aggregate during the 2000s, yet still saw growth in their outer suburbs, even as their cities and high-density suburbs declined in size (Brookings Institution, 2010).

This chapter provides an analysis of industry employment trends, and potential influencing globalization factors (FDI and international trade) for the following seven metropolitan areas and metro types based on the typology outlined earlier (Table 11, below):

<table>
<thead>
<tr>
<th>Category</th>
<th>MSA</th>
<th>Growth</th>
<th>Diversity</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Next Frontier</td>
<td>Denver–Aurora, CO MSA</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Diverse Giant</td>
<td>Chicago–Naperville–Joliet, IL–IN–WI MSA</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>New Heartland</td>
<td>Atlanta–Sandy Springs–Marietta, GA MSA</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Skilled Anchor</td>
<td>Boston–Cambridge–Quincy, MA–NH MSA</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Border Growth</td>
<td>San Antonio, TX MSA</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Mid-Sized Magnet</td>
<td>Chattanooga, TN–GA MSA</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Industrial Core</td>
<td>Cleveland–Elyria–Mentor, OH MSA</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

*Table 11: Typology of seven metropolitan area categories with exemplars.*
Today, these seven regions each take actions to encourage FDI and participate in international trade. Exports bring both revenues and jobs to the metro regions, in cycles that reflect the larger national economy – and in some cases, as in the recent “Great Recession” the global economy that is linked to the fortunes of the U.S. economy. Data from the past seven years illustrate this alignment with broader U.S. and international economic cycles (Figures 14 and 15, below).

Figure 14: U.S. exports, 2005 to 2012 (in $millions)
In both charts, the economic downturn of the 2008 to 2009 period is evident in decreased exports. The exports of most metro areas have regained their pre-2008 levels, however in some regions, earlier export levels have not been achieved. Especially striking in the data shown here is the 2009 inflection point for exports from San Antonio, TX. The increase in exports following that year will be a discussion point in the analysis that follows.

As with the Denver Metropolitan Region, the historical context of industrial development in each forms the basis for contemporary economic activity, including the resources, capabilities and capacities that each has available to take advantage of globalization opportunities in contemporary times. A brief description of the metros’ industrial history and modern economic situation follows. Because the case of the Denver
Metropolitan Region has already been articulated in the previous chapter, it will not be a part of this discussion.

The historic and contemporary industrial development of Atlanta, Boston, Chattanooga, Chicago, Cleveland, and San Antonio provide insight into the resources and capabilities that these metros have at their disposal to develop international export trade and FDI now and in the near future. Economic themes for all the metros include leveraging a natural resources or locational advantage through application of the science and technology of the era, and combining these with strong transportation infrastructure to achieve economic success. Without question, location has played a key role in the site and situation of each of the metropolitan areas in this study.

Access to shipping through ocean ports, seaways, or inland waterways characterizes Boston, Chicago and Cleveland. The ports of Boston, Chicago, and Cleveland developed commercial linkages with the road and rail terminus facilities that brought inland goods and products to the ports’ ocean-bound shipping interests. The construction of the Erie Canal laid the groundwork for the St. Lawrence Seaway, providing shipping access to both Cleveland and Chicago. Now, the St. Lawrence Seaway Development Corporation (SLSDC), a fully-owned federal entity within the U.S. Department of Transportation, manages operations and maintenance of the U.S. portion of the seaway between Montreal and Lake Erie. According to the SLSDC 2013 report, the Seaway annually supports over 225,000 U.S. and Canadian jobs, $14.1 Billion in personal income, $33.6 billion in transportation-related business revenue, $6.4 billion in
local purchases and $4.6 billion in federal, state, provincial, and local taxes. The SLSDC coordinates daily seaway operations with its Canadian counterpart, the St. Lawrence Seaway Management Corporation (SLSMC) (SLSDC, 2013).

Atlanta, Chattanooga, Denver, and San Antonio are situated on rivers that, while not navigable, provided a water supply in arid climates to early inhabitants. These inland metros developed road, rail and air transportation early in their history. Depending on the needs of the region, transportation modes were used to move a variety of goods: tobacco, cotton and other crops in the case of Atlanta and Chattanooga, and livestock in the case of Denver and San Antonio. Each of these inland metros were early adopters of air travel and built facilities to host the commercial aviation industry, which expanded significantly after World War II. When air freight developed as a requirement for the successful export of goods and the conduct of international business, good aviation infrastructure gave metros with modern (or scalable) airport facilities an advantage.

Each metro emerged from the 1970s and 1980s with old manufacturing methods and facilities failing in the face of international competition. This was especially true in the manufacturing economy of Cleveland, where its role in shipping American automobiles, and the parts to service them, declined when Japanese cars and production processes gained prominence. Another case was Chattanooga, where the textile mills that had been a hallmark of the Tennessee River Valley for nearly a century, and the Atlanta rail and trucking logistics infrastructure that had been developed to transport textile goods,
were both impacted by the less expensive overseas labor and textile operations that still have a competitive edge today.

Each of the metropolitan areas in this comparison has a combination of government and quasi-governmental organizations focused on economic development, including international export trade and attracting international business. Atlanta, Boston, Chattanooga, Chicago, Cleveland, and San Antonio have counterparts to the Denver Metropolitan Region’s economic development and international trade organizations that provide services and programs to support and encourage international trade and business.

- Atlanta, GA: The International Trade program within the Georgia Department of Economic Development is the most active organization promoting international trade in Georgia, including the Atlanta Metropolitan Region. The Atlanta Office of International Affairs focuses efforts on cultural exchanges through the Sister City program, and the Metro Atlanta Chamber of Commerce has an International Business newsfeed / blog, with international business news. The Brookings Institution and J.P. Morgan Chase as a participant in their joint 5-year Global Cities Initiative selected Atlanta. A 2013 Forum with international business experts has led to increased export planning activity among members of the Atlanta Metropolitan Region.
• Boston, MA: The Massachusetts Economic Development Alliance (MassEcon, 1993), the Massachusetts Export Center (part of the Small Business Development Center – SBDC), and the Massachusetts Office of International Trade and Investment (MOITI) are the primary organizations that promote economic development and international business. Increasing direct air routes to international destinations and developing a network of global students and alumni are two key MOITI initiatives. Of the seven metros, Boston had the lowest public profile for “boosting” international business and trade. At the same time, the public list of agreements signed with international counterparts was the most extensive of all the metros in the study. (See Appendix III)

• Chattanooga, TN: The Chattanooga Chamber of Commerce International Business Council is the key organization that promotes international business. In 2009, Chattanooga became the first metropolitan area to offer 1-gigabit Internet service. The publically-owned utility prevailed after legal battles with AT&T and Comcast, and high-speed internet is credited with drawing both Amazon.com and gaining the attention of German automaker Volkswagen, which later relocated to this southeastern Tennessee metro (due largely to lower labor costs than in Ohio and Michigan). Exports from transportation industries in the region have resulted in greater export gains than the U.S. as a whole, following the 2008 downturn.
• Chicago, IL: World Business Chicago and the Illinois Office of Trade and Investment (OTI) are the primary organizations fostering export trade and FDI for the Chicago Metropolitan Region. Another invited participant in the Brookings/J.P. Morgan *Global Cities Initiative*, Chicago drafted a 2012 Plan for Economic Development and Jobs that focuses on boosting exports by non-exporting businesses, and attracting targeted FDI to the region (based on high locational quotient industries – those with a high concentration in the Chicago area).

• Cleveland, OH: Regionally-based organizations such as Cleveland+, the Cleveland Council on World Affairs, and the Greater Cleveland Partnership are prominent organizations supporting international business and trade. The decline of the nation’s steel and auto industries hit Cleveland’s manufacturing shipping industries hard. Expenditures on capital projects that did not bring expected revenues, and a lack of investment in education focused on new economy skills in science, technology, engineering, and math left the metro with few resources to adapt to a changing economy. Cleveland has recently refocused on international shipping opportunities with a recently signed agreement with a Dutch shipping company for a direct freight service to Northern Europe, service middle-market manufacturers in the mid-west.
San Antonio, TX: The San Antonio Economic Development Department (EDD), Free Trade Alliance, and Port San Antonio (a designated Foreign Trade Zone) are the primary organizations supporting export expansion and FDI in the San Antonio Metropolitan Region. Historically focused on trade opportunities in Mexico, San Antonio benefited from NAFTA in the 1990s, and the majority of the metro’s trade is with Mexico and South America. Selected by the Brookings Institution / J.P. Morgan Chase to participate in the Global Cities Initiative, San Antonio is hosting a series of events to educate regional business interests on international trade opportunities beyond the Americas.

The international business, export trade, and FDI initiatives that these metropolitan areas are actively pursuing vary in scope and industry focus. As we now turn to the analysis of data related to international export trade and FDI in these metro areas, both measures of success and potential areas for future focus will emerge.

Data

Data used in this analysis were obtained from the same sources as in the analysis of the Denver Metropolitan area: (1) industry employment data from the BLS Quarterly Census of Employment and Wages (QCEW), (2) foreign direct investment (FDI) data from the Bureau of Economic Analysis (BEA), and (3) international trade data from the International Trade Administration (ITA). All NAICS industrial sectors were included in the initial analysis of the seven metro comparisons, to capture all possible relationships
between industry employment changes and the two independent variables, FDI and international trade change.

Limitations to the data used in this analysis are both the scale and the availability of data covering the period of the study. International trade data is available by NAICS only from 1999 forward, so analysis of industry employment changes for 1995 used aggregate trade data that is available for that year, and the 1990 to 1995 period was not included in the analysis. FDI data on Property, Plant and Equipment (PPE) was only collected through 2007, rather than through 2010, the final year in this analysis. A greater concern regarding FDI data is that, while the data on industry employment change are by NAICS sector, these data are only available at the state level. In the cases of four of the metropolitan areas, the MSA selected for this analysis are the largest economic entities in the state, and so are likely to contribute the greatest share of exports for the state. This is the case for Atlanta, Boston, Chicago, and Denver, so state level FDI data were used as proxy for anticipated FDI at the MSA level. For the analysis of these metropolitan areas, which are the major economic entities in the state, using state-level FDI as proxy for FDI in the study region is a reasonable assumption, and an approach which researchers have taken in past (Ajaga and Nunnenkamp, 2008). However, in the cases of Chattanooga, Cleveland, and San Antonio, however, where there were other MSAs likely to account for a significant share of state FDI, the same approach was not feasible. For instance, in the case of Chattanooga, state FDI data would include FDI for Knoxville, Nashville, and Memphis. In the case of Cleveland, state FDI data would include FDI for Cincinnati and
Columbus. In the case of San Antonio, state FDI data would include FDI for Houston, Dallas-Fort Worth, El Paso, and Austin. Other measures of globalization at the MSA level were sought, however extensive research did not render other options for the analysis at hand. International trade and investment data other than those already used for this study are not available at the MSA level. So, in the case of Chattanooga, Cleveland and San Antonio, international export data, and not FDI, were used in this analysis. In addition, to capture FDI influence in the three states where these metros are located, state-level FDI data were analyzed to provide enhanced understanding of FDI influences that, were the data at the MSA level available, would potentially be at work in the three metros.

Having described the sources, types and limitations of the data analyzed for this study, we now move on to the analytical methodology and results of the analysis.

*Analytical Methodology*

The analytical approach taken in this section of the study in large measure matched the approach used to analyze the Denver Metropolitan area dataset. As in that analysis, changes in employment by industry sector, and regression analysis to evaluate the potential impact on industry employment by the two independent variables, FDI and international trade changes were applied to the 7 metro dataset. Again, because the data reflect actual employment numbers, not a sample of the workforce, descriptive statics and regression analysis were applied to the data, rather than using inferential statistical approaches, as would be appropriate for sample data.
The 7-metro analysis took the same two-stage approach as the Denver metro analysis: trends in employment patterns in 5-year increments during the 1990 to 2010 study period were examined at all NAICS levels (2- to 6-digits). Unlike the previous study analytical thresholds were not applied, so that all industry sectors or sub-sectors with significant employment levels were included in the analysis of employment changes year over year. Rates of change in industry employment, FDI, and international trade between each of the 5-year periods in the study scope were calculated and used as the basis for the regression analysis determining relationships between the dependent variable (change in employment) and the independent variables (change in FDI and international trade). The analysis was conducted for each 5-year period, starting with 1995 for FDI (based on change between 1990 and 1995), and starting with 2000 for international trade (based on change between 1995 and 2000). Both analyses were run through 2010. Because there were two independent variables, multiple regression analysis was conducted to predict $y$, industry sector employment. The regression equation used was $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \varepsilon$. In the case of Chattanooga and San Antonio, where a single independent variable was used to predict $y$, the regression equation used was $Y = \beta_0 + \beta_1X_1 + \varepsilon$. Because FDI and international trade data were available at the 3-digit NAICS level, 3-digit NAICS employment data were used in the regression analysis.
**Analysis and Results**

Visual inspection of the change in total employment for each of the seven metropolitan areas illustrates the general employment growth from 1990 to 2000, then the decline during the past decade.

Because data is shown in 5-year periods, the economic downturns after 2001 and in 2008 – 2010 do not stand out. Rather, employment levels in 2010 appear within 90,000 jobs of employment in 2000, with the exception of Atlanta and Chicago, which have employment levels trailing their peak by 153,000 and 353,000 jobs respectively. San Antonio is the exception to the trend of lower employment levels: in 2010, the average total employment was 73,000 higher than in 2000 (Figure 16, below).

![Figure 16: Total jobs in selected MSAs, 1990 to 2010](image)
During the period between 1990 and 2000, analysis of industry employment by SIC classification for the eight metro areas showed changes ranging from -46.13 percent (the decrease in mining jobs in the Denver metro region) to +273.82 percent (the increase in agricultural services jobs in the San Antonio metro region). Compared to the total number of jobs affected during the period, these two cases show minimal impact on the overall number of jobs: a loss of 10,000 jobs in Denver mining employment, and an increase of 5,764 jobs in San Antonio agricultural services. Other cases showed more significant impact, however. Manufacturing jobs in dropped by -32.70 percent in Boston (148,439 jobs lost), -26.68 percent in Cleveland (77,964 jobs lost), and -25.54 percent in Chicago (241,288 jobs lost) for the three metropolitan areas, respectively. The other total decreases in jobs during the past two decades were minor: Denver manufacturing was down by -5.83 percent (5,933 jobs lost), Chattanooga manufacturing was down by 07.13 percent (3,720 jobs lost), and a -7.52 percent drop in San Antonio represented only 504 jobs lost.

Increases in industry employment were especially notable in the services, retail trade, and finance/insurance/real estate sectors. Service sector jobs increased by 223.89 percent in Atlanta (621,364 jobs added), 164.11 percent San Antonio (191,177 jobs added), 138.60 percent in Denver (295,414 jobs added), 99.68 percent in Chicago (922,428 jobs added), and 91.61 percent in Boston (583,559 jobs added), respectively. Even economically challenged Cleveland saw a 67.13 percent increase in the service sector (173,235 jobs added). Other booming employment sectors during the 1990 to 2000
period included construction (which increased by 151.13 percent in Atlanta, adding 107,262 jobs, and by 62.05 percent in Chicago, adding 104,319 jobs), and retail trade (which increased by 121.90 percent and 249,262 jobs in Atlanta, by 86.78 percent and 80,170 jobs in San Antonio, by 27.16 percent and 95,463 jobs in Boston, and by 26.75 percent and 170,838 jobs in Chicago). Finance and real estate brought increases of 89.89 percent (111,942 jobs) to Atlanta, 53.05 percent (96,847 jobs) to Boston, and 45.34 percent (169,993 jobs) to Chicago. Finally, transportation and public utilities brought sector employment increases to Atlanta (126.42 percent growth, adding 121,659 jobs) and Chicago (44.65 percent growth, adding 99,092 jobs).

During the period between 1990 and 2010, analysis of industry employment by NAICS classification for the eight metro areas shows changes ranging from -72.68 percent (the decrease in management jobs in Chattanooga to +109.27 percent (the increase in mining jobs in San Antonio). Again, these minimum and maximum data points represent fairly few jobs (2,780 management jobs lost in the case of Chattanooga and 7,495 mining jobs added in the case of San Antonio). Unlike the previous two decades, however, the industry employment changes in the first decade of the new millennium were relatively small, with only a few sectors losing or gaining over 100,000 jobs. Manufacturing jobs showed the highest losses, with 175,053 jobs lost in Chicago (down 28.95 percent), 84,512 jobs lost in Boston (down 30.70 percent), 60,369 jobs lost in Cleveland (down 32.93 percent), and 51,850 jobs lost in Atlanta (down 25.05 percent). Health care and social assistance showed the highest industry sector growth in
employment, with 101,685 jobs added in Chicago (up 20.64 percent), 75,638 jobs added in Atlanta (up 42.00 percent), and 65,144 jobs added in Boston (up 19.49 percent). The other instance of more than 50,000 jobs added was in real estate and rental and leasing: Atlanta saw gains of 59,387 jobs in this sector, up 59.90 percent over the 10-year period.

Changes in industry employment between the 5-year periods within the study scope may indicate more clearly the perceived trends in job losses and gains in the seven metros. As shown in Figure 17, below, these patterns, like those discussed earlier for the Denver MSA, indicate that industry employment level were dropping before the post-2000 tech bubble burst, and show how losses continued in the 2005 to 2010 period, largely due to the “great recession” of 2008-2010.

Figure 17: Percent change in jobs for selected MSAs, 1990 to 2010
As discussed earlier, FDI investments in PPE rose from 1990 to 2000, declined sharply between 2000 and 2005, then rose again between 2005 and 2007 (Table 12, below). Colorado was the exception to the general decline of PPE investment between 2000 and 2005 when FDI in Colorado rose by a surprising 46.47 percent. Between 2000 and 2007, the most recent data available, Texas and Colorado showed the greatest rebound in FDI with increases of 69.86 percent and 59.35 percent respectively. Ohio (45.94 percent) and Illinois (45.25 percent) showed recovery in FDI rates, while Georgia, Massachusetts, and Tennessee trailed the other metropolitan areas in 2007 FDI levels.

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</tr>
</thead>
<tbody>
<tr>
<td>Colorado</td>
<td>$6,346</td>
<td>31.45%</td>
<td>$8,601</td>
<td>74.03%</td>
<td>$15,319</td>
<td>64.57%</td>
<td>$22,438</td>
<td>59.35%</td>
<td>$35,754</td>
</tr>
<tr>
<td>Georgia</td>
<td>$10,729</td>
<td>34.09%</td>
<td>$22,432</td>
<td>31.55%</td>
<td>$29,510</td>
<td>-19.62%</td>
<td>$23,750</td>
<td>36.98%</td>
<td>$32,532</td>
</tr>
<tr>
<td>Illinois</td>
<td>$23,420</td>
<td>46.48%</td>
<td>$34,305</td>
<td>41.16%</td>
<td>$48,425</td>
<td>-17.79%</td>
<td>$39,809</td>
<td>45.25%</td>
<td>$57,822</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>$8,890</td>
<td>42.94%</td>
<td>$12,707</td>
<td>47.89%</td>
<td>$23,875</td>
<td>-9.95%</td>
<td>$21,500</td>
<td>34.53%</td>
<td>$28,923</td>
</tr>
<tr>
<td>Ohio</td>
<td>$20,749</td>
<td>45.66%</td>
<td>$29,932</td>
<td>25.38%</td>
<td>$37,590</td>
<td>-4.42%</td>
<td>$35,873</td>
<td>37.98%</td>
<td>$53,071</td>
</tr>
<tr>
<td>Tennessee</td>
<td>$10,280</td>
<td>38.39%</td>
<td>$14,227</td>
<td>46.50%</td>
<td>$20,842</td>
<td>-1.08%</td>
<td>$20,616</td>
<td>25.24%</td>
<td>$25,819</td>
</tr>
<tr>
<td>Texas</td>
<td>$35,079</td>
<td>19.38%</td>
<td>$38,142</td>
<td>61.47%</td>
<td>$110,032</td>
<td>-21.59%</td>
<td>$86,280</td>
<td>69.86%</td>
<td>$146,354</td>
</tr>
<tr>
<td>US Total</td>
<td>$578,355</td>
<td>33.05%</td>
<td>$769,491</td>
<td>32.78%</td>
<td>$1,175,628</td>
<td>-6.11%</td>
<td>$1,103,766</td>
<td>38.02%</td>
<td>$1,530,035</td>
</tr>
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Table 12. Number and percent change in FDI for selected states, 1990 to 2007.

Regression analysis of the aggregate dataset bore several similarities to regression results for the Denver MSA. Results of a Fit Y by X multiple regression analysis for Atlanta, Boston, and Chicago, where both FDI and International Export Trade were independent variables, indicate that only four of all industry categories in the three metropolitan areas have p-values (probability of F) less than the 0.05 significance threshold (indicating a 95 percent or greater probability of a real correlation to the independent variables, FDI or international trade). Expanding the significance threshold to 0.10 (90 percent probability of a non-random relationship), the number of industry categories showing significant correlations rises to 10. As for R-squares, where p-values
are higher than 0.10, R-squares range from 0.007 to 0.980, with 10 cases where the R-square indicates an explanatory power for the relationship greater than 70 percent (0.70).

Reviewing industries with p-values smaller than 0.05 (95 percent probability the correlation was not random) and R-squares greater than 0.70 allows for the conclusion that there is correlation between FDI or international export trade in the following sectors (Table 13, below):

<table>
<thead>
<tr>
<th>MSA</th>
<th>Sector</th>
<th>X</th>
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<tbody>
<tr>
<td>Atlanta, GA</td>
<td>Funds, Trusts, Other Financial-525</td>
<td>FDI Change</td>
</tr>
<tr>
<td></td>
<td>Professional, Scientific, and Technical Svcs-541</td>
<td>FDI Change</td>
</tr>
<tr>
<td>Boston, MA</td>
<td>Professional, Scientific, and Technical Svcs-54</td>
<td>FDI Change</td>
</tr>
<tr>
<td></td>
<td>Management, Enterprises-551</td>
<td>FDI Change</td>
</tr>
<tr>
<td></td>
<td>Utilities-221</td>
<td>FDI Change</td>
</tr>
</tbody>
</table>

*Table 13: Atlanta and Boston industries with significant p and R-square values.*

Parameter estimates indicate the predictive power of the independent variable (FDI or international trade), as well as its direction. For example, according to the model, a 1 percent increase in FDI investment in Boston can be expected to be accompanied by a 0.73 percent increase in employment in Management Enterprise. Multiple regression analysis for this first set of metro areas identified no cases where international trade was the correlated independent variable.

The detailed summary of the multiple regression statistics for the Atlanta, Boston, and Chicago MSAs yielded the results shown in Table 14, below:
Table 14: Regression results for Atlanta, Boston, and Chicago MSAs.

Results of a Fit Y by X regression analysis for Chattanooga and San Antonio, where International Export Trade was the independent variable, indicate that only industries in San Antonio show statistically significant correlations to international export trade. Chattanooga has no industries that, after the regression analysis, show results that are statistically significant. Even then, for San Antonio, only one of all industry categories and all cities has a p-value (probability of F) less than the 0.05 significance threshold (indicating a 95 percent or greater probability of a real correlation to the independent variable, international export trade). This case is the San Antonio Textile Product Mills sector, with a p-value of 0.0027. All other p-values for San Antonio are 0.20 or greater, indicating only an 80 percent probability of a non-random relationship. This level of probability is not considered statistically significant. As for R-squares, the San Antonio Textile Product Mills sector indicates a strong explanatory power for the relationship with a result of 1.00. The detailed summary of the regression statistics for the San Antonio MSA yielded the results shown in Table 15, below:
Table 15: Regression results for the San Antonio MSA.

The San Antonio Textile Product Mills case is an example of a very direct relationship between employment and international trade. Table 16 shows actual employment figures for this industry during the period of the study show abrupt tapering after 2000.

Table 16: San Antonio Textile Product Mills employment, 1990 to 2010.

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<tbody>
<tr>
<td></td>
<td>825</td>
<td>1536</td>
<td>1096</td>
<td>226</td>
<td>0</td>
</tr>
</tbody>
</table>

There was no information publicly available on this specific case, however news accounts from contemporary San Antonio press releases indicate the closing of production facilities in general in the early part of the decade. It is possible that a plant (or several small plants) devoted to the manufacture of textile products exclusively for export were subject to these plant closings.

As mentioned earlier, because Chattanooga, Cleveland and San Antonio are not primate cities in their respective states, regression analysis of FDI at the state level was conducted to gain greater understanding of the potential influence of FDI in these three cases. The detailed summary of the multiple regression statistics for Ohio, Tennessee and Texas yielded the results shown in Table 17, below:
Table 17: Regression analysis results for Ohio, Tennessee, and Texas.

Most of the industry sectors in the analysis showed p-values greater than 0.05, indicating a lack of statistical significance. However, there were four industry sectors that showed a p-value less than 0.05, indicating the 95 percent likelihood that the null hypothesis may be rejected and that the correlation exists between FDI and industry employment in those sectors. Three of these are in the state of Tennessee: Support activities for mining, Electronic markets and agents and brokers, and Management of companies and enterprises. The fourth is in Ohio (Apparel manufacturing). The R-square values for these four sectors indicate that the model is a good fit with a high degree of explanatory power. However, only one of the four shows a positive correlation to FDI. Management of companies and enterprises in Tennessee shows a parameter estimate greater than zero at 1.1911. Given foreign ownership of enterprises that have built automobile manufacturing facilities in Tennessee, this is not entirely surprising. The recent establishment of a VW plant near Chattanooga, TN is a case in point.

### Discussion

The data suggest overall that, like the Denver case, while there has been growth of both FDI and international trade in the past 20 years, these two factors are typically
correlated with industry employment growth in very selected industry sectors in the metropolitan regions where they take place. The Atlanta Metropolitan Region’s strengths as a logistics and supply chain hub enable the flow of goods throughout the Southeast to the main Georgia port of Savannah (Siphon, 2013). However, regression analysis for this study showed that the sector where there was the strongest correlation between a globalization factor (FDI) and industry employment was in the Professional, Scientific, and Technical Services. This is not entirely unexpected, given the international prominence of biosciences research in the Atlanta region, specifically in the Centers for Disease Control (CDC), and the strong technology base leveraged by telecommunications firms such as CNN and AT&T (formerly Southern Bell Communications). Professional, Scientific and Technical Services in the Boston Metropolitan Region were notable in the regression results for that region, and reflect the strong research and business connections between internationally-known educational institutions (MIT, Harvard, Boston University) and entrepreneurial technology and business applications firms that have clustered along Massachusetts Route 128 (Judge, 1997). With regard to the impact of FDI on employment in this area, the Boston Metropolitan Region has benefited from the international reputations of its educational institutions and the advanced technology firms in the metro region’s near periphery.

The regression results for Chicago showed no correlation with international export trade, and correlation with FDI that was very low in statistical significance for the two affected sectors: Professional, Scientific and Technical industries, and the
Educational Services sector. An explanation for this low correlation with globalization factors may be that Chicago Metropolitan Region employment is not highly affected by international factors, although international enterprises conduct extensive business with area firms. This is potentially the case where the volume of international client work is a small percentage of the total work activity, especially in services industries where technology-enabled transactions are performed by a fairly small number of managers, and do not require large numbers of employees as production facilities would.

The demographic factors identified by the Brookings Institution analysis may potentially have greater impact at present than factors representing globalization. Along this theme, the metros with low educational attainment (Border Growth / San Antonio, Mid-Sized Magnet / Chattanooga, and Industrial Core / Cleveland) can be expected to have difficulty spurring the development of new, entrepreneurial businesses that are known to be engines of job creation at the local level. The metros with low diversity (New Heartland / Atlanta, Mid-Sized Magnet / Chattanooga, and Skilled Anchor / Boston) may lack the socio-cultural variety that has also been associated with new small business establishment, thus creating jobs, and also influences the multicultural competencies of their inhabitants, which could be a competitive advantage in global business ventures or in attracting the location of global businesses. For their part, the Next Frontier and Diverse Giant metros, while economically and educationally viable and diverse, will need to address gaps in wages and educational attainment by their
community members – not all are on the “fast track” that is more available in these metros than others.

The geographic attributes of a place that draw foreign investment and enable international trade are evolving with the growth of a more integrated global economy. It is feasible that, several decades in the future, FDI and international trade will have a much greater influence on employment levels in certain industries than is the case today. The data will give evidence to such a change, should it change in the future.

**Conclusion**

Denver and the seven metropolitan areas at the focus of this study face a challenging future. From both an industry and occupational perspective, shifts in employment appear to gradually reflect macro-scale globalization trends that are driving a decline in traditional manufacturing, increases in lower-wage service jobs, and outsourcing of call center and selected information processing jobs. Labor markets are showing subtle shifts from relatively plentiful jobs that require little specialized or advance education, to less plentiful jobs that require targeted and specific training or extensive formal learning. Fields where jobs are growing, such as healthcare, will be subject in part, at least, to demographic trends. As the Baby Boomer generation ages, increasing numbers of healthcare jobs will be required, but with the passing of that demographic bubble, employment opportunities in healthcare may shrink substantially. The relationship between these demographic trends, globalization and employment is a question that is not yet urgent enough to spur public agencies and researchers to start
planning for the identification and collection of data to examine future trends. As such, it is of interest, but beyond the scope of this study.

This study provides a foundation for continued examination of industry employment trends at a finer level of granulation. In particular, identifying sources of data at the Metropolitan Region level will be key to more accurate and precise analysis. Further exploration of the factors that represent drivers of globalization will give greater insight into the impacts of global economic change on the jobs that firms need to fill to compete globally, and the occupations that citizens need to prepare for in order to achieve a career and lifestyle to which our current citizenry has become accustomed.
Chapter 5: Analysis of Perspectives on the Impact of Globalization on the Denver Metropolitan Labor Market from Explicit Reports

This chapter contains the third of three analytical components of the research study. The focus of this third analysis is a qualitative study of the Denver metropolitan region, based on explicit reports (survey responses) by participants in the local community and labor market (people in business, consulting, the public sector, and education). Using a qualitative approach leads to understanding of individual and collective conceptualization of workforce issues, and allows for exploration of individual experiences, perceptions, and responses to social processes that affect the nature and range of proposed solutions to labor shortages. Qualitative approaches are especially helpful in identifying future trends in labor and skill needs from diverse perspectives.

This chapter will provide an overview of the rationale and application of a qualitative approach, followed by the specific analytical methodology used for this study’s survey: the identification of potential survey participants and construction of survey panels, the survey timeline and communication process, the organization of data, and the process used in the coding and interpretation of results. Next, results of the survey are analyzed and discussed, followed by conclusions based on this analysis for the larger topic of this study.
Background

Because the responses of local firms, governmental entities, and educational institutions to changes in regional occupational employment needs in the Denver metropolitan area are conceptualized and implemented by individuals in roles within these organizations, individual experience and social (or organizational) structures and processes on programs developed and actions taken have a fundamental and pervasive influence. This makes the qualitative approach appropriate for the research study at hand.

Human geographers note that in the current post-modern, post-structural era of research, qualitative approaches aid in answering two fundamental questions:

1. What are the shapes of social structures and by what processes are they constructed, maintained, legitimized, and resisted?

2. What are individuals’ experiences of places and events?

The purpose of using a qualitative approach in this analysis was to identify community responses to changes in local occupational employment, understand the individual and collective conceptualization of workforce issues, explore the individual experiences and social processes that affect the nature and range of proposed solutions to job-and-skill mismatches, and to identify future trends in occupational labor needs from diverse perspectives. The unique strengths and weaknesses of the survey and interview approach as a research tool are presented below, to further illuminate their choice for the study at hand.
Surveys (or questionnaires) and interviews are categorized as explicit reports: the people who participate in such projects explicitly recognize that the researchers using such methods are studying them. Explicit reports measure beliefs people have about themselves, other people, places or events, activities or objects. Responses are understood to be those of the research participants, are based on their own thoughts and opinions, and frequently cannot be judged on their face as right or wrong. Surveys and interviews are the most common type of explicit reports, but others are focus groups, protocol analyses, and tests (Montello and Sutton, 2006).

As with any research methodology, there are strengths, weaknesses and challenges to collecting and analyzing data through surveys and interviews. A first significant benefit of both methods is that the data gathered will be primary data – they will be tailored specifically to the research question at hand (Montello and Sutton, 2006).

Advantages of surveys are:

• They provide insight into social trends, processes and interpretations

• The enable extensive distribution over a large or geographically disperse population

• They are cost effective (particularly if administered online at low or no cost to the researcher)

• They are flexible – they can be combined with more intensive forms of qualitative research, such as follow up interviews (McGuirk and O’Neill, 2005)
There are three main types of interviews: (1) structured interviews, which follow a predetermined and standardized list of questions, (2) unstructured interviews, where the research participant directs the conversation, and (3) semi-structured interviews, which has some form of predetermined order (especially at the beginning or end) but allows flexibility in the way the research participant addresses the questions or issues that are raised during the interview (Dunn, 2005). Semi-structured interviews were conducted with selected research participants who completed this survey.

Advantages of interviews are that they may:

• Fill a gap in knowledge when other methods are unable to do so

• Enable the researcher to investigate complex behaviors and motivations

• Allow the researcher to collect diverse perceptions of meaning, opinion, and experience

• Reveal different opinions or debates on issues, or reveal consensus on such issues

• Show respect for, and even empower participants to provide information that is valued by and valuable to the researcher

• Give the research participant opportunity to reflect on their experiences, thoughts, and opinions (Dunn, 2005)
Given the benefits of surveys and interviews, their limitations must also be explored.

Limitations of explicit reports are:

- Research participants may try to give socially desirable answers to “please” the researcher conducting the interview

- Since the information gathered constitutes personally held beliefs, they may not represent objective “truth” or “accuracy”

- Limits to memory include accuracy and completeness, the recency of the event being recalled, the impact of emotion on memory, and the time frame that the researcher asks the respondents to account for

- Research participants may give distorted responses because of interviewer “artifacts” (appearance, demographic characteristics, personal style, wording of items, or nonverbal cues)

- In some cases, research participants may seek to derail or damage the efforts of the researcher (for a variety of reasons that are meaningful to the research participant)

In addition to the limitations noted above, there are cognitive limitations related to how language encodes and expresses the research participant’s experience and opinions, the tendency to construct an answer if one doesn’t know or is unaware of the phenomenon about which they are being asked. More mundane challenges involve the
logistics of survey and interview administration: materials development, recruiting respondents, scheduling meetings (for interviews), communications related to survey administration, to mention a few (Montello and Sutton, 2006).

Quantitative analysis can be conducted on closed-ended responses to survey items. The purpose of quantitative analysis for closed-ended responses is to obtain an overall description of the aggregate data results. Closed-ended items give respondents a finite number of response options. The most common types of closed-ended items are:

- Rating scales (generic, Likert, semantic differential, paired comparison)
- Forced-choice alternatives (True / False, Yes/ No, or multiple choice)
- Ranking of alternatives (1st, 2nd, 3rd, etc.) (Montello and Sutton, 2006)

To obtain quantitative data from closed-ended survey, the researcher must tabulate the data from completed survey instruments and perform statistical analysis on the aggregate data. Such analysis may include descriptive statistics such as (1) central tendency (mode, median, mean), (2) variability (range, variance, standard deviation), (3) form (modality, frequency, skewness, symmetry/normality), (4) derived scores (rank, percentile), or (5) relationship (linear/nonlinear, positive/negative, correlation) (Montello and Sutton, 2006). As with most survey research, the study at hand stopped at the application of descriptive statistical analysis of survey results, since qualitative analysis through mixed-methods involving interviews or other qualitative data-collection approaches was used. In contrast to close-ended questions, open-ended questions are by
nature qualitative. In the case of this study, survey results were analyzed using a mixed-methods approach, combining qualitative methods, with coding and key themes analysis.

Coding data transforms survey and interview results into a format that makes quantitative analysis possible. Apart from this, there are other purposes to coding data. According to Cope, the purposes of coding include: (1) data reduction (enabling the researcher to distill key themes), (2) organization (enabling researchers to “find” data once processed and coded), and (3) analysis of the data (Cope, 2005). In the first step of the coding process, the researcher develops a list of the themes that are expected in the qualitative results. After Strauss, Cope suggests four meta-themes to include are (1) conditions, (2) interactions among actors, (3) strategies and tactics, and (4) consequences (Cope, 2005). The next step is to organize the codes, recognizing clusters of meaning or similarity. Next, the researcher develops a code log or code book. Finally, the researcher starts coding the interview or survey results, tabulating the coded data in some form of recording medium. In the case of this study, many of these steps were conducted using NVivo, a content analysis application.

Cope notes that coding is recursive – a repetitive process of identifying initial codes, then adding to the initial list as review of research questions, literature, and other sources sparks the identification of additional codes. She states that coding is also reflexive – as new themes are identified, formerly coded material will need to be re-coded to include the new concepts (Cope, 2005).
Data from the surveys formed the core of the qualitative analysis, aimed at identifying how firms, independent business owners, local and state planners, and local and state educational institutions are responding to changes in occupational employment needs. Occupational trends and future needs were also identified during this phase of the study.

**Analytical Methodology**

The qualitative analysis of the Denver Metropolitan labor market entailed gathering data through explicit reports (surveys) and selected interviews of members from four groups, listed below:

1. For-profit companies:
   a. Corporate executives and strategic business unit managers
   b. Human Resources and recruiting specialists (internal and external)
2. Independent business owners and consultants
3. Government or non-profit economic and employment specialists:
   a. Federal: Labor (DOL), Education (DOE)
   b. State: Economic and Workforce Development, Job Centers
   c. County or Local: Economic and Workforce Development, Job Centers
4. Educators, vocational and other:
   a. Schools:
      i. Vocational schools and technical colleges
      ii. Community colleges
      iii. Public, 4-year colleges and universities
iv. Private, 4-year colleges and universities

v. For-profit colleges

b. Job training and apprentice programs

Criterion sampling was used to identify the initial list of survey recipients. For-profit companies were identified from Colorado Department of Commerce Bureau of Economic Analysis data on Colorado firms with the highest annual revenues in 2013. This proved the most challenging group to receive response commitments from for three reasons. First, contact information for individuals in for-profit companies is not generally available other than corporate management or generic recruiting contact email addresses. Second, the strategic nature of questions around globalization and future impacts on firms are of key interest to senior company management, however these individuals have very little time to respond to survey requests. Third, the topic of globalization is fairly abstract, and without a pressing business need (or personal interest), is not one that most business leaders take significant time to reflect upon. These challenges were addressed through extensive individual contacts, both directly, and through known professional contacts with the business representatives who, in the end, completed the survey.

Independent business owners and consultants were not included as a category of potential survey respondents in the dissertation proposal, but were added to the categories of respondents for several reasons. First, since approximately 70 percent of business entities in the Denver Metropolitan Region are small and medium-sized businesses (SMBs), these individuals and entities represent a highly significant share of the business population in the study area. Second, given that large companies dominate current
competition in local and national markets, SMBs are highly incented to explore non-traditional markets for their products and services, including leveraging opportunities in international markets, and welcoming investment by international business interests locally. These objectives are supported by state agencies such as the Colorado Office for Economic Development and International Trade (OEDIT) and regional entities such as the Metro Denver Economic Development Corporation (along with its local partners), among others. Potential survey respondents in this group were identified and contacted through multiple channels, including obtaining email addresses obtained through organization websites and professional contacts through networking groups (North Denver Moxie, Greater Denver Region Organizational Development Network, Mile High Society for Human Resources Management, 530 Inc., and the Rocky Mountain Chapter – American Society for Training and Development).

Government economic and employment specialist entities were identified through convenience sampling, resulting from research exploring relevant agencies in Colorado and the Denver Metropolitan regions. Using state, county and local governments in the region as a starting point, economic and workforce development units and partners were identified, and contact information for managers and staff in these agencies was located. The government entities contacted with the request to complete the survey included the following:

Educators were identified from research into a range of educational institutions in the study region, both public and private, and at various levels of post-secondary
education. Potential respondents from vocational schools, technical colleges, community colleges, and 4-year colleges and universities were identified, along with administrators and career counselors at the Colorado Community College System (CCCS) and several metro area school districts.

As anticipated, individuals who were contacted suggested additional firms, agencies, and individuals to survey or interview. This process combined chain sampling and opportunistic sampling approaches.

Limitations to the respondent sample were consistent with typical challenges experienced by researchers conducting surveys. While contact information for individuals in public and educational organizations was accessible through online sources, information about potential respondents from firms and small businesses was extremely difficult to find. This is reflected in the distribution of survey invitations sent to potential respondents from the four identified roles.

Drafts of the survey instruments for each of the four respondent groups are included in Appendix V. The mixed-method survey format included:

- Closed items, with multiple types, including questions with a 5-point Likert scale, alternative ranking, paired comparisons, and others
- Open items coded for analysis
- Selected standardized items on every survey (comparison across groups)
• Selected non-standardized items specific to respondent roles (comparison within groups)

Pre-testing of the survey was conducted in January 2014 with eight professional contacts, representing each of the four groups (two for each group). These individuals were not part of the sampling frame used to select the respondents to the final versions of the survey instruments. Pre-testing resulted in changes to language, question order, supporting and transition text, and other survey elements to make the questionnaire more clear, and capable of eliciting more precise responses. The survey was open for six weeks, starting February 3 and closing March 16, 2014. Survey respondents were contacted primarily by email, using the survey panel communication tools in Qualtrics, the online survey application. Surveys were completed online, and follow-up email exchanges were conducted in cases where the respondent wished to provide additional input to the research topic.

Results of the survey were analyzed using a mixed methods approach. First, quantitative methods were used to analyze close-ended responses. Data from completed surveys were tabulated, descriptive statistical analysis was conducted on the aggregate data. This analysis included central tendency (mean), and variability (range, variance, standard deviation) (Montello and Sutton, 2006). Next, qualitative methods were used to analyze open-ended responses. Key theme identification was conducted by first reviewing word frequency analysis to obtain an overview of common concepts, then
coding was conducted to extract additional detail and context underlying the responses of survey participants.

Before starting the coding process a list of anticipated themes was developed. After Cope, meta-themes are over-arching themes that incorporate the essential content of the responses received. These include:

1. Conditions – the current state or circumstances perceived by the respondents; their perception of the existing status or state of the world
2. Interactions among actors – observations related to the actions of a group of relevant stakeholders; their interactions with others related to the issue at hand; how those interactions affect expected and unanticipated outcomes
3. Strategies and tactics – actions taken in the near and long term to effect change or address issues that are of concern
4. Consequences – the results of actions taken, dependent on the original conditions, influenced by the individuals or groups participating, directly resulting from their actions (Cope, 2005).

Next, open-ended responses were analyzed using coding, followed by key theme analysis. The latter was accomplished using the text analysis application NVivo, which facilitates the coding, organizing and analyzing key themes from open-ended survey response questions. Results of this analysis are presented in the next section.

**Analysis and Discussion**

Anticipated themes identified for further investigation in the qualitative analysis of survey results included the following:

3. International economic competition – current and future
4. Workforce capability related to globalization – current and future

5. Collaboration and cooperation between business, education, and government – current and future

6. Preparation for global economy – business, education, public sector

7. Impacts of globalization – on business, education, public sector

These anticipated themes align with Cope’s suggested meta-themes of conditions (#1 and #2), relationships (#3), strategies and tactics (#4) and consequences (#5) (Cope, 2005).

Exploration of the quantitative aspects of survey results started with analysis of descriptive statistics. First, the distribution of roles, organization size, number of years operating in Colorado, and presence beyond Colorado were examined. As expected, survey completion rates were quite low. However, multiple follow-up reminders yielded a total of 50 responses from all groups with 3 (6 percent) from government and non-profits, 10 (20 percent) from business, 12 (24 percent) from small business owners and consultants, and 25 (50 percent) from educators. This exceeded the target of 40 responses originally identified in the study proposal.

Respondents represented organizations that were mainly either between 1,000 and 4,999 employees (16 or 32 percent), between 100 to 499 employees (7 or 14 percent), or under 10 employees (16 or 32 percent). The relatively large number in the last category
reflects the prominence of small business owners and consultants as a proportion of the total respondent population.

Very few respondents worked in organizations with employees outside of the U.S. (43 or 86 percent). Several in the business and education sectors worked in organizations with an international footprint, but these were in the minority.

Respondents also represented organizations with varying years experience operating in Colorado: 15 (30 percent) had been operating in Colorado between 21 and 50 years, and 13 (26 percent) had been operating in Colorado more than 70 years. The strong representation from the education sector explains this long tenure in part, however government organizations also contributed to the long operating history in Colorado.

Comparing perceptions of the industry landscape in the Denver Metropolitan Region is one way to check the mental maps that respondents in different roles brought to their survey comments. As illustrated in Table 18, below, respondents in the public sector and small business owners were asked which industries have the largest footprint in the Denver Metropolitan Region. Multiple selections were allowed, and their responses illustrate the diversity of perspectives represented in the survey responses.
Table 18: Perceptions of industries with the largest Denver Metro Region footprint.

Responses illustrate that small business owners and public sector respondents have similar conceptions of the industry footprint with relationship to accommodations, administrative and support services, information, management, and real estate. However, they have very different perceptions with respect to industries such as agriculture, health care, professional services, and transportation and warehousing.

Responses to closed-ended questions were examined as the next step in the quantitative exploration of survey data. Closed-ended questions of particular interest to this study focused on perceptions of whether or not the Denver Metropolitan Region’s labor market meets companies’ workforce needs to compete in the face of globalization now, and will do so in the future. Table 19, below shows that respondents from the different roles have widely varying views regarding the capacity of the Denver Metropolitan Region’s local labor market to meet needs.
Respondents who are in businesses and who are business owners appear much more sanguine than educators and those in the public sector regarding the ability of the Denver Metropolitan Region labor market to meet workforce needs currently. In exploring this issue with several business respondents in follow-up calls, it became clear that they were thinking in terms of the past 2 – 3 years as a point of comparison, and see the current availability of needed talent to be sufficient for their current needs. With the loss of jobs during the Great Recession, businesses had a much larger pool of talent from which to choose in filling the positions that they recruited for. This bounty is perceived by business and SMB owner respondents as the current talent pool environment, however they expressed concern about the Denver Region’s ability to provide a labor market with skills businesses anticipate they will need in the next four years (2015 – 2018).

Turning to the qualitative analysis of open-ended questions in the research survey, the analytical approach consisted of exploratory frequency analysis, followed by coding

Table 19: Labor market capacity to meet Denver MSA workforce needs.

<table>
<thead>
<tr>
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</tr>
</thead>
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<td>Business</td>
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and detailed analysis of responses to open-ended questions. Results from the exploratory frequency analysis and then responses to each of the primary survey questions will be discussed in this section. Summary results will be provided for each question, followed by analysis of significant differences in the response pattern by role.

The exploratory frequency analysis was applied to the top 50 words throughout the survey. The frequency analysis grouped words that had the same etymological stem, or were synonyms. This query resulted in 20 terms with a frequency of 0.65 or higher in open-ended response questions throughout the survey, across participants in all four roles, as shown in Table 20, below.
Table 20: Exploratory frequency analysis of open-ended questions.

Comparing the overall frequency analysis with those performed with the same query parameters for the individual roles yielded the following comparison. In Table 21, below, frequency weighted percentages above 1.00 are highlighted in gold, those between 0.65 and 1.00 are highlighted in green, and those below 0.50 are highlighted in red.
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<tr>
<th>Word</th>
<th>All Roles Weighted Percentage (percent)</th>
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<th>Owner Weighted Percentage (percent)</th>
<th>Educator Weighted Percentage (percent)</th>
<th>Public Sector Weighted Percentage (percent)</th>
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</table>

Table 21: Exploratory frequency analysis by role.

Since educators accounted for 50 percent of the total respondent population, the alignment between educator and overall frequency rates is not surprising. Of interest to this analysis are the areas where respondents from business, small business ownership, and the public sector align with and diverge from the educator and overall results.

Follow-up interviews with small business owner participants revealed that they focus more on the niche skills that allow them to innovate in the marketplace and pragmatic skills that they need to run virtually all functions of their small business.
operation. Neither of these types of skills is commonly included in secondary or post-secondary curricula, so the term education was not used as frequently by small business owners to describe their challenges in the face of globalization, or their perception of necessary skills. The few public sector participants represented agencies involved with the shaping and delivery of workforce centers, where the mission is to provide job counseling and training for workers in transition, frequently due to layoffs. Here, the terminology used is client rather than student and training rather than education. The low frequency count associated with student for the public sector participants is thus understandable.

We now turn to analysis of open-ended responses. Questions in the survey are presented first, with summaries of overall responses, and analysis of significant differences in responses by role. There were eight clusters of related questions. Each cluster will be presented along with sub-themes articulated where the responses provide distinction. Then, major themes in the responses are identified and associated with the meta-themes identified by Cope’s framework for categorizing qualitative research results (Cope, 2005). Specific questions under each cluster are outlined in Appendix IV.

**Question cluster #1: Definitions of globalization and its drivers**

Respondents from all groups noted trans-boundary connections of business, communications or relationships. Participants in business, SMB owner, and public/government roles identified the cost of doing business (labor, taxes, materials), new revenues from new markets, and client expectations for services to be provided
regardless of physical, political or temporal boundaries as both aspects of the definition and also drivers of globalization. Educators highlighted the need for students to learn skills for a global world, but were not specific. They noted the rise of varieties of online learning (MOOCs) in terms of both delivery technology and also curriculum design. This group was less specific in articulating drivers of globalization than other respondent groups. Educators also seemed more idealistic about future outcomes and opportunities of globalization, adding a positive tone to comments about linkages between people, cultures, and ideas.

Question cluster #2: Effects of globalization on industries and organizations, now and in the future

The general tone of all responses was the increasing pace of change, the need to learn about other cultures to be effective and successful in business, and the increasingly pervasive nature of technology. Government respondents highlighted the need to “get better at doing business with business”. Educators noted the current impact of international students on classrooms (especially Chinese), curriculum and employees of institution, and also highlighted the growing prevalence of online course technology (and only see this increasing, resulting in more competition for students worldwide).

Business and business owners called out the impacts of globalization on supply chains. Some of these were positive, such as lowering costs; others negative, such as increased time to market with products, difficulties with non-English speakers in call centers for English-speaking customers. Many noted the need to develop global brands,
and a global sales force. Business owners spoke about the prospective reduced value as the number of “virtual” consultancies grow, and also about 24/7 client requirements. A few respondents predicted the “equilibration” of various forces of globalization (including cost of labor internationally), and note their organizations are concerned about the next disruptive technologies.

**Question cluster #3: Workforce challenges and how organizations are responding**

The availability of a workforce with skills that match needs was a major theme in responses to this question. Business and business owner respondents highlighted the need for people with the right skills, who can work virtually, and gain new product and client knowledge fast. They also highlighted the need for a flexible workforce – finding the balance between skills “in-house” with contract talent with needed skills; “right talent, right time”. Business and owners also noted effective onboarding and retention as areas to improve upon. Educators commented on the lack of K-12 education preparation, the motivation of students, and the inability of educational structures to expose students to realities and opportunities of work post-graduation.

The need for critical and creative thinking skills, and effective communication skills was noted. Educators and Government respondents noted the flow of skilled workers from outside the region who compete with students from the region. Immigration and how to handle a growing population with low skills, and the lack of student interest
in and preparation for trades (“middle-level skills”) was another theme in Educator and Government responses.

**Question cluster #4: Workforce assets and successful actions to address workforce needs caused by globalization, now and in the future**

A theme among all respondents was the Denver Metropolitan Region’s ability to attract talent due to its location, climate, active lifestyle, and vibrant urban scene. The highly educated workforce was noted as a particular asset, as was the virtual (technology) infrastructure and the technological knowledge (“savvy”) of the Denver workforce. Government respondents noted the strength of Denver’s diverse, multicultural workforce, and Educators highlighted the range of educational institutions and educated workforce.

Business respondents commented on organization-specific workforce assets, in particular, openness to different ways of doing business, looking for new talent, and cross-industry networking. They noted the strength of leadership teams and mid-level managers who “have seen it all and know what to do”, build strong relationships across the organization, and rethinking work and the competencies or skills needed.

Future workforce assets listed by respondents were very similar to current assets. Notable exceptions were a significant number of comments around building social, mobile and cloud technology infrastructure, knowledge and skills. Business respondents made organization-specific comments related to building new skills in data analytics, implementation of a new common technology platform, new approaches to clients (architecture-oriented, design-centered, focus on pre-sales). SMB owners highlighted
anticipated new technologies that will support their business operations and communications with clients (previously only available to large companies).

Educators noted that institutions capabilities to deliver online courses and meet the needs of multicultural and international students will grow in the near future. They expressed concerns over funding to meet the demands of educating students for the new economy, but expressed optimism that recognition of the problem may lead to joint solutions. Government respondents predicted increased collaboration and partnerships between business, education and government to provide innovative combinations of training with business focus and educational credit that meet the Denver Metropolitan Region’s current and future workforce needs.

**Question cluster #5: Capacity of the Denver Metropolitan Region to meet workforce needs**

Of all respondents, 64 percent think the Denver Metropolitan Region labor market currently meets workforce needs and 36 percent think it does not meet workforce needs. Regarding the ability of the region to meet workforce needs in the future, 53 percent responded that they believe the region will meet needs, and 47 percent responded they do not think the region will meet workforce needs (Table 22, below).
Table 22: Ability of the Denver Metro Region to meet workforce needs

Not surprisingly, the responses show variation by role. Government respondents are much more pessimistic about the current ability of the region to meet workforce needs, while Business and SMB Owners are very optimistic that the region currently meets needs. Educators are more measured in their response, but are generally positive about the region’s ability to meet workforce needs in the present.

Perceptions of future prospects are more tempered. Government respondents show more optimism that the region will meet workforce needs, and Business, SMB Owners, and Educators show more pessimism about the ability to meet workforce needs.

In terms of what is and is not sufficient, respondents were split on the availability of technical talent in the Denver Metropolitan region. Some Business and Business Owners indicated there is a good base of technically skilled workers, while others noted that specific technical needs (software engineers and application developers) are in short supply. This group of respondents also noted the need to develop more consulting and design skills to meet future business needs. Government and Business Owners
commented on the good supply of business operations generalists in finance and accounting, human resources, and marketing. Educators tended to focus on perceived shortcomings in the Denver Metro Region’s workforce, especially with regard to communication skills of recent graduates, and the ability of new professionals to be effective in workplaces with a wide range of generations.

**Question cluster #6: Skills needed for organizations to succeed, now and in the future**

Common themes in responses to questions in this cluster included current and past skills in communication, critical thinking, and multicultural facility. Business and Business Owners who responded focused on technological skills, and knowledge of basic business operations and processes. A few respondents from international companies noted the need for global business skills is already a requirement for their organizations. Educators noted past and current capability needs in terms of teaching students critical thinking and working with multicultural student bodies (with the latter shifting to international students in present and future).

Regarding future skills needs in the face of globalization, Educators’ responses echoed the responses give by Business, Business Owners, and Government responses for current skill needs. Business and SMB Owners added electronic and social communication skills, both the ability to self-manage and also teamwork (including virtual team effectiveness), and knowing multiple languages to complete successfully in a globalizing economy. This group also predicted that future jobs will demand highly
specialized knowledge and skillsets (“a foot wide and three miles deep”) of individual contributors, before they make the shift to management and leadership roles that will require broader skillsets. Educators responded that employers would look to educational institutions to develop skills in their workforce, while Government respondents comment that outsourcing employee development to third parties would be likely. This was in sharp contrast to Business and SMB Owner respondents, who indicated they would source employees with new skills globally, and perhaps even virtually.

**Question cluster #7: Education resources and organizations’ educational resource needs**

There was a wide range of responses to this cluster of questions, with sharp differences between the responses of Educators and Business and Business Owner respondents. The latter group praised the move to online learning, both for traditional education programs and for more business-specific training. Beyond that, however, comments were that, in general, education is far behind in terms of responding to known knowledge and skills needs that will develop and produce the workforce that business needs. Out-dated programs in several areas were noted, including school marketing curricula focused on print and television, rather than Internet and social media. The lack of application to real-world issues and problems was highlighted, especially with regard to business degree programs, which Business and SMB Owners reflected were too theoretical and do not deliver on the promised knowledge and skillsets of graduates upon completion. Very few of the Business or Business Owner respondents indicated that they
would utilize college certificate or degree programs to develop workforce skills. Instead, they highlighted on-the-job training, mentoring, and professional association or conference participation as the methods they use to develop their workforce.

In contrast, Educators responses highlighted the belief that they listen effectively to business educational needs, and provide programs designed to address these needs, although several commented on how difficult it is to harness this information and analyze it for academic program development. A common theme was the lack of funding for education, particularly at the K-12 level. Educators focused on how hard they are working to raise the education level of the students they serve and how they strive to develop curricula that are applicable to the world of work (“career ready” was the term used by several respondents).

Government responses focused on initiatives and partnerships to update curricula, implement innovative educational programs, encourage apprenticeships or internships, and serve as a facilitator to connect business and educational interests and stakeholders. This group also commented on their role in developing, gathering, reporting and monitoring metrics that measure the effectiveness of educational programs.

**Question cluster #8: Government or public resources and organizations’ governmental resource needs**

Respondents were nearly unanimous in calling for better cooperation between government, business and education in order to pool knowledge and resources in meeting workforce preparation and skill-development needs both current and in the future.
Beyond that theme, however, respondents were significantly polarized in their responses to this cluster of questions. A majority of Educators highlighted the lack of funding for education in general, and K-12 in particular, and indicated public officials were not successful in persuading the public to support increases in education funding. Some noted efforts that public agencies make to ascertain workforce needs from businesses, and articulate them to educational institutions, as well as training and “re-skilling” offered by regional workforce centers. However, others commented that public focus was more directed at business development and skills training than broader workforce preparation (implied to be the work of educational organizations).

Business and SMB Owners were split in their perceptions of the effectiveness of government efforts on behalf of building the Denver Metropolitan Region’s workforce, with some noting the success of workforce training programs to meet basic needs, and others opining that (federal) government should leave training and education to the market and return funding to the state for distribution to local community institutions. Several commented on the basic skills training offered through regional workforce centers, or noted that their only interaction with the government was through unemployment programs. Some Business and SMB Owners indicated that government policies regarding employment were outdated (“not all employees can be W-2’d”) and did not provide incentives to employers for tapering the employment of workers nearing retirement age (“resulting in un- or under-employment”). There was a strong positive response to the quality of former Department of Defense (DoD) workers, who bring
advanced technical skills that are transferrable to business (specifically, *gamification* in simulation and online learning, that is, computer application programming that incorporates game theory to enhance learning and knowledge retention).

Moving now to the broader meta-theme framework proposed by Cope, this analysis now focuses on several over-arching themes that emerged from the survey responses. First, regarding international economic competition (meta-theme: *conditions*), respondents noted the opportunities and challenges of growing participation in an increasingly international economy. Comments relating to this theme included:

- It is difficult to attract businesses to the area within a competitive environment that includes national and international development opportunities outside of the Denver Metropolitan Region

- Technology enables consultants to reach beyond geographic borders, which means so much more competition yet so many more opportunities

- Economic growth outside the U.S., and limited growth opportunities in the U.S., driving clients to expand globally

- Daily competition with those in other countries enabled by faster communications and transportation

Technology as both enabler and driver of increasing globalization was a common theme. Particular among the small business owners who produced services for sale
(online learning, for example), noted that their clients are international, as well as local and national, and that they routinely work with contract employees in other states, and even other countries. That other communities seek to attract international investment and trade was not lost on survey participants. They noted the heightened degree of competition for both business development, especially with international partners or majority non-U.S. owned businesses, as well as international trade. (Officials with the public sector, focused on economic development were particularly sensitive to this issue.)

Next, regarding workforce capability related to globalization – current and future (meta-theme: conditions), several survey participants were optimistic about the region’s ability to continue and grow its reputation of having a highly educated, “world class” workforce:

- The region is able to attract highly educated workers The economic base is diverse and entrepreneurial World class educational institutions
- A broad multicultural workforce poised to expand DMR’s economic influence regionally and internationally
- Education growth and increased focus on postsecondary and workforce readiness Partnerships between business, economic development and education in a comprehensive and organized manner
Other comments reflected the ongoing discussion around the philosophy of education – to develop learners, or to prepare graduates for jobs. One respondent in particular declared:

- We educate and don't think of it in terms of competition

Regarding collaboration and cooperation between business, education, and government – current and future (meta-theme: relationships), most comments from public sector participants, and a good portion from educators reflected a firm and growing conviction that collaboration and partnerships between business, education, and government will be required for the state’s workforce, infrastructure and business environment to enable the Denver Metropolitan Region to fully participate and compete in the global economy:

- Working hand in hand with economic development to attract businesses to the area, and incorporating more stackable certification and degrees for a continuum of lifelong learning
- May lead to new programming and international educational partnerships
- Collaborative potential, competition, resource leveraging

Nearly all of the local economic development agencies, state agencies, and community colleges have advisory boards that include stakeholders from business,
government, community leaders and education, in order to understand others’ needs, resources, interests and capabilities.

Moving to preparation for global economy – business, education, public sector future (meta-theme: strategies and tactics), respondents’ comments related to this theme ranged from personal growth in understanding globalization and its impacts to the individual, to organizational tactics and strategies to compete effectively in future:

- I will need to become more informed in global business practice and stay up to speed (with skills related to) technology
- We will continue to have a variety of materials available in other languages and will see more non-stop flights to international destinations being established
- We'll continue to see messaging and efforts that pull in international partners and people to what Colorado is doing in terms of higher education, innovation, and business opportunities
- We will need to create and sustain a business-led Colorado talent system that appropriately integrates the work of economic development, education, training and workforce development to meet the needs of businesses, students and job-seekers

Finally, regarding the impacts of globalization – on business, education, public sector future (meta-theme: consequences), survey participants noted the themes of speed,
change, integration, and increasing connectedness that accompany increasing global economic integration:

- Instant information, international trade, importing, exporting; the world is flat
- Generating more competition, but also opening new markets, and opportunities for collaboration
- Increasing global connectivity, integration and interdependence in the economic, social, technological, cultural, political, and ecological spheres

Not surprisingly, given that traditional manufacturing does not make up a large portion of the economy in the Denver Metropolitan Region, there were few comments related to off-shoring jobs from the local market. Some respondents noted the need for advanced manufacturing to remain in the region, where the benefits of research institutes (both in higher education and government facilities) and the transportation connections to both coasts and internationally are seen as a competitive advantage of the region.

In addition to the key themes noted above, some survey participants noted on the increasingly international population in some parts of the region (Aurora, in particular). They commented on the need to provide education and jobs for many who – as refugees – arrived in the region with few assets and negligible English language skills. It bears noting that immigrants have flocked to the Denver Metropolitan Region throughout its history, with many becoming central to both the local economy and providing connections with increasingly strong international trade partners (Denver’s Japanese
community is just one example). The refugee immigrants of today may very well bring such international opportunities to regional businesses in future.

**Conclusion**

Including a qualitative analysis element to the research approach of this study enabled the researcher to identify responses to changes in local occupational employment as perceived by community members in business, education and the public sector. Differences in perceptions between people in large business environments and small business owners added a dimension to the understanding of workforce issues gave important insights into a part of the business sector which is not easily captured in most data sources.

The respondents to the research survey were, overall, cautiously optimistic regarding the potential for positive economic impact resulting from increasing global integration and international trade. They noted the challenges that the Denver Metropolitan Region needs to meet, in order to leverage the advantages of its highly educated workforce, research and development facilities (in both government and higher education settings), transportation infrastructure, and a business climate that balances benefits for enterprise and communities in the region. At the same time, respondents sounded concerns regarding the ability of the region to maintain its high-quality talent pool, and the competition for global partners and trade that the region faces as other communities across the nation seek the growth the believe globalization will bring. The collaboration among regional partners in education, government and business promises to
play a significant role in the Denver Metropolitan Region’s ability to “make globalization work” in future. The extent of those partnerships is unique in the nation, and could well prove to be the region’s greatest competitive advantage in the next ten to twenty years.
Chapter 6: Conclusion

In the past twenty years, globalization – the functional integration and geographic spread of connected economic activities at the global scale – has had both observable and intangible impacts on business and labor markets. While impacts of global economic change on local labor markets have been expected, and conclusions about their impact have been made in news reports and policy panels, there is little in the research literature that provides insight into the empirical dynamics of the interrelationship between global economic change and local labor markets.

The hypothesis at the foundation of this study was that, in metropolitan areas where the forces of global economic change are at work, either (1) FDI or (2) international export trade will correlate to changes in industry employment in local labor markets. The results of regression analysis of these two globalization proxy measures in both the Denver Metropolitan Region and the six other metros that were examined, showed that the data support the hypothesis in select industries where there are geographic advantages, such as pipeline transmission and data processing hosting services (Denver), professional, scientific and technical services (Atlanta), and management enterprise functions (Boston). But, the data do not support the hypothesis “across the board”.
Furthermore, analysis of explicit reports by members of the Denver Metropolitan Region answers the question of how businesses and communities have responded to globalization. This study has shown that the metros studied in this research have unique regional economic development entities that partner to attract FDI and encourage international export trade. It also revealed that, even among the highly collaborative Denver Metro stakeholders, individuals vary widely in perception of readiness, skills needed, and preparations for global futures.

This study has extended disciplinary understanding in several key areas. First, it examines the effect of potential drivers of globalization on industry employment, not only the distribution and patterns of employment as have previous studies (Shearmur, et al., 2007). It also identifies specific industries that have been affected by FDI and international export trade (such as computer electronic manufacturing in the Denver MSA or textile product mills in San Antonio), not only larger regions that have been impacted by FDI (such as the U.S. South) (Glasmeier and Leichenko, 1996). Third, this study provides an explanation of economic change impacts in the context of globalization forces, and does this for metropolitan areas other than the “global cities” of New York, London and Tokyo that have been the focus of such in-depth study in past literature (Sassen, 2001). Finally, after extensive review of the literature to date on the topic, this is the first study of FDI and international export trade impacts on metropolitan regions.

There are still further avenues for research, however, based on previous work in the discipline. One interesting avenue, building on the work of Chapple, Markusen, et al.,
is to more closely examine the correlation of FDI and export trade with employment in the high-tech and information technology industries (Chapple, et al., 2004). Exploring worker mobility impacts on employment, FDI or international export trade is another potential area for further research, building on Cebollada’s previous work on worker mobility in areas served by public transit (Cebollada, 2009). Examining the influence of place-based social constructs on globalization factors and effects is a third potential avenue for further research, carrying forward the work that Susan Hanson and Geraldine Pratt have started (Hanson and Pratt, 1992). As the country continues the climb out of the “Great Recession”, furthering Hobor’s work on the restructuring of local economies, the notion of healthcare economies, and their relationship to FDI and export trade growth is another area with potential interest. And, examining the policy contexts that influence FDI and export trade at the metropolitan level would extend and deepen work by Ettlinger and Digiovanna exploring policy applications at a more general level is a final additional avenue for further research that would build on the foundation provided by this study (Ettlinger, 1994; Digiovanna, 1996).

It is not necessary to wait for the findings of further research to take action that will improve the FDI and export trade landscape for metropolitan regions, their leaders and citizens, however. Metros should start to analyze data on the effects of FDI and international export trade outcomes to confirm whether or not their actions are having intended effects – and if not, redirect their focus and energies. Educators should build curricula that are change sensitive, that is, on an ongoing basis, ensure curricula are
responsive to current workforce needs. Educators and businesses should combine theoretical and empirical knowledge about the future workplace and the potential demands of a global economy to develop occupational skill profiles that prepare students of all ages for future workforce needs. And, community leaders should work together with educators and business to build, coach to, and provide work experience in these skills so that graduates come to the labor pool with knowledge and experience that firms want and need.

Stakeholders and representatives of the people in metropolitan communities should continue their efforts to focus and coordinate economic development planning and development, so that isolated self-interest and unwillingness to work for the greater good of the region do not derail efforts to attract FDI and export trade – and their spillover effects – that will ultimately benefit the whole region. And, rather than holding to a parochial “with our own hands” approach, community members should seek out collaborative learning and opportunities offered by sharing experiences and best practices with other metropolitan areas, and institutions or agencies that are reaching out with offers to help build acumen and leadership to leverage the benefits of FDI and international export trade for their respective communities. An example of this is the Global Cities Initiative, that is co-sponsored by the Brookings Institution and JP Morgan Chase, aimed at helping the leaders of metropolitan America strengthen their regional economies by becoming more competitive in the global marketplace.
The nature and availability of jobs in a rapidly globalizing world economy is of critical importance to the people who are at the heart of the Denver metropolitan community, and other communities across the nation. Businesses, government planners, and educational institutions each are impacted by, and have a role to play in a business environment where industries move away, change their business requirements and workforce skill needs, or cut jobs as they streamline their operations.

The dynamics of these processes are complex, with drivers of, and responses to economic change happening at global, national, regional, and local levels. This research sought to shed light on the interactions between global economic change and local labor market adjustments as a dynamic system that was not well understood. It will be very satisfying if this study has contributed to the discipline’s broader knowledge and understanding of the facets, forces, and impacts of the global economic changes on metropolitan regions. It is hoped that this work will also inspire the stakeholders and citizens of the Denver Metropolitan Region, and other metro regions, to seek new ways to create and sustain abundant and rewarding future work for our communities and the individuals who live in them.
Bibliography


Colorado Tourism Office (CTO) [http://www.colorado.com/international-promotions-program](http://www.colorado.com/international-promotions-program) (last accessed 21 April 20140).


Appendices

Appendix I: Industries by Supersector and NAICS Code

http://www.bls.gov/iag/tgs/iag_index_naics.htm

This list of industries included in Industries at a Glance is arranged in North American Industry Classification System (NAICS) code order. Each industry sector and subsector is placed into the appropriate group: Goods-Producing Industries or Service-Providing Industries. For purposes of the research plan outlined in this proposal, the following industry sectors will be the focus of comparison:

Goods-Producing Industries

- Manufacturing
  - Manufacturing (NAICS 31-33)
  - Computer and Electronic Product Manufacturing (NAICS 334)
  - Electrical Equipment, Appliance, and Component Manufacturing (NAICS 335)
  - Transportation Equipment Manufacturing (NAICS 336)

Service-Providing Industries

- Trade, Transportation, and Utilities
  - Transportation and Warehousing (NAICS 48-49)
    - Air Transportation (NAICS 481)
    - Rail Transportation (NAICS 482)
    - Water Transportation (NAICS 483)
    - Truck Transportation (NAICS 484)
    - Pipeline Transportation (NAICS 486)
    - Support Activities for Transportation (NAICS 488)
    - Couriers and Messengers (NAICS 492)
    - Warehousing and Storage (NAICS 493)
  - Utilities (NAICS 22)

- Information
  - Information (NAICS 51)
• Publishing Industries (except Internet) (NAICS 511)
• Internet Publishing and Broadcasting (NAICS 516)
• Telecommunications (NAICS 517)
• Data Processing, Hosting, and Related Services (NAICS 518)
• Other Information Services (NAICS 519)

• **Financial Activities**
  • Finance and Insurance (NAICS 52)
    • Monetary Authorities - Central Bank (NAICS 521)
    • Credit Intermediation and Related Activities (NAICS 522)
    • Securities, Commodity Contracts, and Other Financial Investments and Related Activities (NAICS 523)
    • Insurance Carriers and Related Activities (NAICS 524)
    • Funds, Trusts, and Other Financial Vehicles (NAICS 525)

• **Professional and Business Services**
  • Professional, Scientific, and Technical Services (NAICS 54)
  • Management of Companies and Enterprises (NAICS 55)
  • Administrative and Support and Waste Management and Remediation Services (NAICS 56)
    • Administrative and Support Services (NAICS 561)
Appendix II: Distribution for Explicit Reports (Surveys)

Explicit reports (surveys) were sent to four groups to identify community responses to changes in local occupational employment, and to identify future trends. The three groups included: (1) business owners, (2) enterprise employees, (3) educators, and (4) public economic and development organizations (government and non-profit). Four separate surveys were administered to reflect the different perspectives of the respective groups.

Identified survey participants included:

**Firms**

Corporate executives and strategic business unit managers, and Human Resources and recruiting specialists (internal and external) were contacted at:

1. Lockheed Martin Corporation (Aerospace & Defense Related Systems) – VP, Human Resources
2. Raytheon Company (Aerospace Systems & Software) – VP, Human Resources
3. Ball Corporation (Aerospace, Containers) – VP, Human Resources
4. United Airlines (Airline) – VP, Human Resources
5. Molson Coors Brewing Co. (Beverages) – VP, Human Resources
6. Sprint Nextel Corporation (Cellular & Wireless Phones) – VP, Human Resources
7. Level 3 Communications (Communication & Internet Systems) – VP, Human Resources
8. IBM Corporation (Computer Systems & Services) – VP, Human Resources
9. Western Union (Consumer Credit Card & Related Services) – VP, Human Resources
10. Wells Fargo Bank (Financial Services) – VP, Human Resources
11. DaVita Inc. (Health Care: Medical Facilities) – VP, Human Resources
12. Exempla Healthcare (Healthcare) – VP, Human Resources
13. Kaiser Permanente (Healthcare) – Regional VP, Human Resources
15. Liberty Media (Internet Services and Retailing) – Regional VP, Human Resources
16. United Parcel Service (Parcel Delivery) – Regional VP, Human Resources
17. DISH Network (Satellite TV & Equipment) – Regional VP, Human Resources
18. Oracle (Software & Network Computer Systems) – Regional VP, Human Resources
19. Comcast Corporation (Telecommunications) – Regional VP, Human Resources
20. Xcel Energy (Utilities) – VP, Human Resources

**Government economic and employment specialists**

*Federal: Labor (DOL) + Education (DOE)*

1. U.S. Department of Labor (local representatives)
2. U.S. Small Business Administration (local representatives)

*State: Economic Development + Job Centers*

1. Colorado Office of Economic Development and International Trade – Director
2. Colorado Small Business Development Center (SBDC) Network – Director
3. Colorado Department of Labor, Division of Employment and Training – Director
4. Colorado Workforce Council – President

*County / Local: Economic Development + Job Centers*

1. Metro Denver Economic Development Corporation (EDC) – Director
2. Denver Small Business Development Center (SBDC) – Director
3. Denver Regional Council of Governments (DRCOG) – President
4. Downtown Denver Partnership – President
5. Denver Workforce Center – Director
6. Jefferson Economic Council (JEC) – President
7. Jefferson County Workforce Center – Director
8. Aurora Economic Development Corporation (EDC) – Director
9. Englewood Economic and Business Development – Director
10. Lakewood Economic Development – Director

**Educators: vocational and other**

*Schools / Job training and apprentice programs*

1. Colorado Community College System (CCCS) – President
2. Emily Griffith Opportunity School (EGOS) – Director
3. Pickens Technical College – Director
4. University of Phoenix (local representatives) – Director, Denver Region
5. ITT Technical Institute (local representatives) – Director, Denver Region
Appendix III: International Agreements by the Massachusetts Office of International Trade and Investment (MOITI)

The Massachusetts Office of International Trade and Investment, on behalf of the Commonwealth, negotiates, administers and implements Agreements or Memoranda of Understanding with other countries, international regions or foreign development agencies. Agreements advance Massachusetts’s economic development priorities by strengthening international collaboration in areas of mutual interest, such as trade and investment, economic opportunity, science, technology, innovation and education.

Australia

Title: Memorandum of Understanding on Investment and Trade Information Exchange and Promotion between the Department of Innovation, Industry and Regional Development and the Massachusetts Office of International Trade and Investment

Date signed: 11/0/2009

Participating Entity: State of Victoria, Australia

Signatories: Victor Perton, Commissioner to the Americas

Description: Memorandum of Understanding between the State of Victoria, Australia and the Commonwealth of Massachusetts aimed at promoting bilateral trade and investment as well as information and academic exchange.

Canada

Title: Joint Declaration on Research, Science and Technology Cooperation between the Commonwealth of Massachusetts and Québec.

Date signed: 3/31/2009

Participating Entity: Ministry of Economic Development, Innovation and Exportation (MDEIE) of Québec
Signatories: Geneviève Tanguay, Assistant Deputy Minister of MDEIE

Description: Joint declaration on research, science and technology cooperation between the Commonwealth of Massachusetts and Québec with an intention to bring significant bilateral economic and social benefits to both regions.

Canada

Title: Understanding between the Government of the Commonwealth of Massachusetts and the Gouvernement du Québec with Respect to the Exchange of Law Enforcement Information.

Date signed: 11/13/2007

Participating Entity: Government of Québec

Signatories: Monique Gagnon-Tremblay, Minister of International Relations; Jacques P. Dupuis, Minister of Public Security

Description: The understanding allows both parties to exchange security information to strengthen internal security between the United States of America and Canada.

Chile

Title: Memorandum of Understanding on the Fields of Education, Energy and Biotechnology between the Republic of Chile and the Commonwealth of Massachusetts.

Date signed 9/23/11

Participating Entity: Republic of Chile

Signatories: Sebastián Piñera, President of Chile

Description: Promotes collaboration in the fields of human capital, energy, biotechnology, and the strengthening of the scientific and technological development between the Republic of Chile and Commonwealth of Massachusetts.

China

Title: Memorandum of Agreement Promoting Friendship and Cooperation between Guangdong Province and the Commonwealth of Massachusetts.
Date signed: 5/7/1992

Participating Entity: Guangdong Province, China

Signatories: Zhu Senlin, Governor of Guangdong

Description: Agreement on the promotion of friendship and cooperation between Guangdong and the Commonwealth of Massachusetts.

China

Title: Memorandum of Understanding between the Hebei Province, PRC and the Commonwealth of Massachusetts.

Date signed: 9/18/2006

Participating Entity: Hebei Province, China

Signatories: Zhaoshi Hong, representing Hebei Governor Gengmao Guo

Description: Memorandum of Understanding on promotion of Hebei Province and the Commonwealth of Massachusetts via reciprocal company assistance and support for increased FDI in both regions.

China

Title: MOU on Two-Way Investment Promotion Cooperation between the Massachusetts Office of International Trade and Investment and the Investment Promotion Agency of the Ministry of Commerce of the People's Republic of China (CIPA)

Date signed: 6/23/2008

Participating Entity: Investment Promotion Agency of the Ministry of Commerce of the People’s Republic of China (CIPA)

Signatories: Hua Yu, Deputy Director General of CIPA

Description: Memorandum of Understanding in order to enhance two-way cooperation and investment.
China

Title: Memorandum of Understanding on Investment and Trade Information Exchange and Promotion between the Beijing Municipal Commission of Commerce and the Commonwealth of Massachusetts Office of International Trade and Investment.

Date signed: 6/16/2010

Participating Entity: Beijing Municipal Commission of Commerce

Signatories: Wen Han, Deputy Director General, Beijing Municipal Commission of Commerce

Description: Memorandum of Understanding focusing on information exchange, foreign direct investment and innovation referrals.

Israel

Title: Agreement between the Government of the Commonwealth of Massachusetts and the Government of the State of Israel on Bilateral Cooperation in Industrial Research and Development.

Date signed: 3/10/2011

Participating Entity: State of Israel

Signatories: Shalom Simhon, Minister of Industry, Trade and Labor

Description: Agreement between Massachusetts and Israel to develop and strengthen economic, industrial, technological and commercial cooperation.

Japan

Title: Joint Declaration on the Promotion of Friendship and Affiliation between the Commonwealth of Massachusetts and the Prefecture of Hokkaido, Japan.

Participating Entity: Hokkaido, Japan.

Date signed: 7/16/2010

Signatories: Osamu Taki, Vice Governor of Hokkaido

Description: Joint Declaration on the Promotion of Friendship and Affiliation between the Commonwealth of Massachusetts and the Prefecture of Hokkaido, Japan on the
Twentieth Anniversary of the Massachusetts-Hokkaido Sister-State Affiliation for the purpose of further promoting friendly relations and mutual understanding between the people.

Portugal

Title: Sister State Agreement between the Commonwealth of Massachusetts and the Azores Autonomous Region, Portuguese Republic

Date signed: 6/26/2008

Participating Entity: Azores Autonomous Region

Signatories: President Carlos Cesar, Azores Autonomous Region

Description: Sister State Agreement between the Commonwealth of Massachusetts and the Azores Autonomous Region to encourage the growth of trade and investment relations within the framework of global free trade.

South Korea

Title: Memorandum of Understanding on Cooperation in Life Sciences and High Technology Industries between the Commonwealth of Massachusetts and the Seoul Metropolitan Government.

Date signed: 4/19/2011

Participating Entity: Seoul Metropolitan Government

Signatories: Myunho Shin, Assistant Mayor, Economic Promotion Headquarters, Seoul

Description: MOU between Massachusetts and Seoul to strengthen ties in the life sciences and high technology industries.

Spain

Title: Declaration of Intent of Cooperation between the Commonwealth of Massachusetts and the Generalitat de Catalunya.

Date signed: 3/17/1992

Participating Entity: Catalonia, Spain
Signatories: Joaquim Pujol I Figa, Secretary General-Generalitat de Catalunya

Description: Declaration of Intent of Cooperation between the Commonwealth of Massachusetts and the Generalitat de Catalunya

Spain

Title: Declaration of Intent of Cooperation between the Commonwealth of Massachusetts and the Generalitat de Catalunya.

Date signed: 6/20/12

Participating Entity: Catalonia, Spain

Signatories: Artur Mas i Gavarró, President of Catalonia

Description: Governor Deval Patrick signs memorandum of understanding between the Commonwealth of Massachusetts and Catalonia at the 2012 BIO Convention. It drafts a new agreement off of the old one to better collaborate in specifically the life sciences, renewable energy, information technology, advanced infrastructure, and academic cooperation.

Sweden and Denmark

Title: Memorandum of Understanding on Collaboration and Research & Development in the Life Sciences between the Political Regions of Medicon Valley and the Commonwealth of Massachusetts.

Date signed: 6/20/2012

Participating Entity: Political Regions of Medicon Valley—Skane, Sweden and Zealand, Denmark

Signatories: Swedish and Danish Government Officials

Description: The agreement focuses on enhancing research partnerships in life sciences by an exchange of researchers and students; identifying special projects, partnerships or collaborations that can lead to new or enhanced research opportunities; and establishing a framework to be used in joint projects that could be financed by the European Union or National Institute of Health to develop new products and processes that can be used in the global market.
Appendix IV: Question Clusters for Qualitative Analysis of Explicit Reports

Question cluster #1: Definitions of globalization and its drivers

• For your organization and the industry it competes in:
  
  – How do you define globalization?
  
  – What are the key drivers of globalization for your industry?

Question cluster #2: Effects of globalization on industries and organizations, now and in the future

• How is globalization affecting your industry?

• How is globalization affecting your organization?

• How will globalization affect your organization in the next 10 years? Beyond 10 years?

• How will globalization affect your industry in the next 10 years? Beyond 10 years?

Question cluster #3: Workforce challenges and how organizations are responding

• What are your organization’s greatest challenges now? In the next four years?

• How is your company responding to workforce challenges now? In the next four years?
Question cluster #4: Workforce assets and successful actions to address workforce needs caused by globalization, now and in the future

• What are your organization’s greatest workforce assets now? In the next four years?

• What are the most innovative managers in your organization doing to recruit, develop and retain people with the critical skills your organization needs now? In the next four years?

Question cluster #5: Capacity of the Denver Metropolitan Region to meet workforce needs

• Does the Denver Metropolitan Region labor market meet your organization’s workforce needs now? Will it in the next four years?

• What is sufficient now? What is not sufficient not?

• What will be sufficient in the next four years? What will not be sufficient in the next four years?

Question cluster #6: Skills needed for organizations to succeed, now and in the future

• What skills did employees (students) need before globalization reached the scale it has today?

• What skills do employees (students) need for your organization to succeed in the face of globalization?
• Regarding changes in the skills that are most critical to your organization’s success in the past five years:

• What has changed?

• What drivers have caused the change?

• What skills do you think employees (students) will need for organizations in your industry to succeed in the face of globalization in the next 10 years? Beyond 10 years?

• How do you think organizations will obtain employees with the skills they need to compete effectively in the next 10 years? Beyond 10 years?

Question cluster #7: Education resources and organizations' educational resource needs

• Regarding what educators (educational organizations) are doing to prepare a pipeline of skilled workers for your organization to hire in the next four years

• What are they doing?

• Will this be sufficient? In what way?

• Will this be lacking? In what way?

Question cluster #8: Government or public resources and organizations' governmental resource needs
• Regarding what governmental organizations are doing to prepare a pipeline of skilled workers for your organization to hire in the next four years

• What are they doing?

• Will this be sufficient? In what way?

• Will this be lacking? In what way?
Appendix V: Survey – Globalization and Denver Jobs

Different versions of the survey instrument were sent to members of the three identified groups (firms, governmental economic agencies, and educators). Each version of the survey will have selected questions in common, with additional questions specific to the specific respondent group.

Versions of the firm survey instruments are included below. With identified exceptions, questions from the Business owner survey were reframed to ask how enterprise employees, government or non-profit officials and educators (1) view workforce challenges and the local labor marker in the Denver Metropolitan region and (2) provide services to develop workforce skills or impact the pipeline of skilled workers.
Globalization and Denver Metro Jobs

Q1  Do you wonder what the jobs of the future will be? For you? For your family and friends? For your kids, or your friends’ kids?

Please take 15 - 20 minutes to complete this survey, and find out!

The results from this survey will give us all insight into how globalization is affecting business and jobs in the Colorado Front Range. Your responses will be identified by code number only and will be kept separate from information that could identify you. The survey will be open through Sunday, March 16, 2014.

I encourage you to take the survey - and forward it to your networks - so that we can all benefit from broad and diverse perspectives of as many bright and inquiring people as possible! If you prefer referring individuals personally, please direct them to the survey link at:  http://tinyurl.com/GlobalizingDenverJobs

If you would like a summary copy of the survey results, please provide your email address in the space provided at either the beginning or end of the survey.

If you have questions at any time, please contact me at sharon.gabel@du.edu.

Thank you!

Sharon Gabel Department of Geography and the Environment University of Denver
Q2 INFORMED CONSENT FORM  Survey: Occupational Employment Challenges in a Globalizing Economy

Note: Informed consent is a cornerstone of ethical research. It's a requirement of all academic research, and is designed to protect you - the survey participant. Questions? Please ask! - Sharon Gabel - sharon.gabel@du.edu.

You are invited to participate in a study that will assess the extent to which globalization is affecting the types of skills available to and required by companies in the Denver Metropolitan region. In addition, this study is being conducted to fulfill the requirements for the doctoral degree. The study is conducted by Sharon Gabel. Results will be used to analyze the impacts of globalization on the Denver Metropolitan occupational labor market, and as the basis for a dissertation required for completion of the doctoral degree. Sharon Gabel can be reached at sharon.gabel@du.edu. This project is supervised by the dissertation advisor, Dr. Andrew Goetz, Department of Geography and the Environment, University of Denver, Denver, CO 80208, 303-871-2866 or agoetz@du.edu.

Participation in this study should take about 15-20 minutes of your time. Participation will involve responding to questions about workforce skill needs, availability and development in the Denver Metropolitan region. Participation in this project is strictly voluntary. The risks associated with this project are minimal. If, however, you experience discomfort you may discontinue the interview at any time. We respect your right to choose not to answer any questions that may make you feel uncomfortable. Refusal to participate or withdrawal from participation will involve no penalty or loss of benefits to which you are otherwise entitled.

Your responses will be identified by code number only and will be kept separate from information that could identify you. This is done to protect the confidentiality of your responses. Only the researcher will have access to your individual data and any reports generated as a result of this study will use only group averages and paraphrased wording. However, should any information contained in this study be the subject of a court order or lawful subpoena, the University of Denver might not be able to avoid compliance with the order or subpoena. Although no questions in this survey address it, we are required by law to tell you that if information is revealed concerning suicide, homicide, or child abuse and neglect, it is required by law that this be reported to the proper authorities.

If you have any concerns or complaints about how you were treated during the study, please contact Paul Olk, Chair, Institutional Review Board for the Protection of Human Subjects, at 303-871-4531, or you may email du-irb@du.edu, Office of Research and Sponsored Programs or call 303-871-4050 or write to either at the University of Denver, Office of Research and Sponsored Programs, 2199 S. University Blvd., Denver, CO 80208-2121.
You may print a copy of this page for your records (do this while on this page). Entering your name below will signify your consent to participate in this project. If you do not understand any part of the above statement, please email the researcher at sharon.gabel@du.edu with any questions. I have read and understood the foregoing descriptions of the study called Occupational Employment Challenges in a Globalizing Economy. I have asked for and received a satisfactory explanation of any language that I did not fully understand. I agree to participate in this study, and I understand that I may withdraw my consent at any time.

Q4

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you would like a copy of the summary results, please provide your email address.

Q6 There are different versions of this survey. Please indicate which of the following best describes your role:

- Business - you work in a for-profit company
- Education - you are an educator, student or educational administrator
- Public or Non-Profit - you work in a government, public or non-profit organization
- Business Service Provider - you are a consultant or you provide business services

Q111 Occupational Employment Challenges in a Globalizing Economy – Educator Perspective Thank you for participating in this survey. Your responses will be identified by code number only and will be kept separate from information that could identify you.
Q112 What industries does your institution prepare students for employment in?

- Accommodation and Food Services
- Administrative and Support Services (includes Business Services, Consulting, Waste Management)
- Agriculture, Forestry, Fishing and Hunting
- Arts, Entertainment, and Recreation
- Construction
- Educational Services
- Finance and Insurance
- Health Care and Social Assistance
- Information (includes Broadcasting, Data Services, Publishing, Telecommunications)
- Management of Companies and Enterprises
- Manufacturing
- Mining, Quarrying, and Oil and Gas Extraction
- Professional, Scientific, and Technical Services (includes Accounting, Advertising, Legal)
- Public Administration (includes Public Safety)
- Real Estate and Rental and Leasing
- Retail Trade
- Transportation and Warehousing
- Utilities
- Wholesale Trade

Q113 About your institution and your role:

<table>
<thead>
<tr>
<th>Where is your institution headquartered?</th>
</tr>
</thead>
<tbody>
<tr>
<td>If your institution operates outside of Colorado, where does your company operate? (Please describe both physical and virtual operations.)</td>
</tr>
<tr>
<td>Please describe your role at this institution.</td>
</tr>
</tbody>
</table>
Q114 Do you have responsibility for (check all that apply):

- Recruiting students
- Counseling students
- Career development services for students
- Mentoring programs for students
- Teaching students
- Taking courses
- Supervising internships
- Participating in internships
- Supervising capstone projects
- Supervising theses or dissertations
- Developing curriculum
- Supervising student projects with employers
- Building or managing relationships with employers
- Conducting research – individual
- Conducting research – collaborative
- Hiring staff
- Developing staff (informally or formally, includes succession planning)
- Hiring faculty
- Developing faculty (informally or formally, includes succession planning)
- Leading an academic unit within the institution
- Leading a division of the institution
- Leading a revenue-generating unit within the institution
- Leading the institution (executive management)
- Other
Q115 Which of the descriptions below apply to your institution? (Select all that apply)

- [ ] Non-profit educational institution, public
- [ ] Non-profit educational institution, private
- [ ] For-profit educational institution
- [ ] Single establishment, Colorado
- [ ] Multiple establishment, Colorado and US
- [ ] Vocational institution, pre-collegiate
- [ ] Vocational institution, collegiate (undergraduate)
- [ ] Academic institution, 2-year
- [ ] Academic institution, 4-year
- [ ] Academic institution, graduate or professional programs
- [ ] Technical institution, post-collegiate
- [ ] Secondary school - high school
- [ ] Secondary school - middle school
- [ ] Multinational, US parent
- [ ] Multinational, non-US parent

Q116 How many years has your institution operated in Colorado?

- [ ] 0 to 3 years
- [ ] 4 to 6 years
- [ ] 7 to 10 years
- [ ] 11 to 20 years
- [ ] 21 to 50 years
- [ ] 51 to 70 years
- [ ] More than 70 years
Q117 How many employees does your institution have in Colorado? (Not temporary or contingent workers)

- More than 10,000
- 5,000 to 10,000
- 1,000 to 4,999
- 500 to 999
- 100 to 499
- 50 to 99
- 10 to 49
- Less than 10

Q118 How many employees does your institution employ in all US locations? (Not temporary or contingent workers)

- More than 10,000
- 5,000 to 10,000
- 1,000 to 4,999
- 500 to 999
- 100 to 499
- 50 to 99
- 10 to 49
- Less than 10

Q119 How many employees does your institution employ in all non-US locations? (Not temporary or contingent workers)

- More than 10,000
- 5,000 to 10,000
- 1,000 to 4,999
- 500 to 999
- 100 to 499
- 50 to 99
- 10 to 49
- Less than 10
Q125 For your institution, and the educational sector it competes in:

<table>
<thead>
<tr>
<th>How do you define globalization?</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the key drivers of globalization for your educational sector?</td>
</tr>
</tbody>
</table>

Q126 How is globalization affecting your educational sector?

| Now? |
| In the next four years? (2015 - 2018) |

Q127 How is globalization affecting your institution?

| Now? |
| In the next four years? (2015 - 2018) |
Q128 What skills did faculty and staff need before globalization reached the scale it has today?

<table>
<thead>
<tr>
<th>At your institution?</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the educational sector your institution competes in?</td>
</tr>
</tbody>
</table>

Q129 What skills do students need to succeed in the face of globalization?

<table>
<thead>
<tr>
<th>Now?</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the next four years? (2015 - 2018)</td>
</tr>
</tbody>
</table>

Q130 What are the Denver Metro Region's greatest workforce challenges?

<table>
<thead>
<tr>
<th>Now?</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the next four years? (2015 - 2018)</td>
</tr>
</tbody>
</table>
Q131 What are the Denver Metro Region's greatest workforce assets?

<table>
<thead>
<tr>
<th>Now?</th>
<th>In the next four year? (2015 - 2018)</th>
</tr>
</thead>
</table>

Q132 What are the most innovative educational institutions in the Denver Metro Region doing to help companies recruit, develop and retain people with the critical skills they need to be competitive?

<table>
<thead>
<tr>
<th>Now?</th>
<th>In the future?</th>
</tr>
</thead>
</table>

Q133 How is your institution helping companies respond to workforce challenges?

<table>
<thead>
<tr>
<th>Now? (in 2014)</th>
<th>In the next four years? (2015 - 2018)</th>
</tr>
</thead>
</table>
Q134 Will the Denver Metropolitan Region labor market meet companies' workforce needs...

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Now? (in 2014)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the next four years? (2015 - 2018)</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Q135 Regarding how the Denver Metropolitan Area labor market meets companies' workforce needs:

<table>
<thead>
<tr>
<th></th>
<th>Now, in 2014?</th>
<th>In the next four years? (2015 - 2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is (will be) sufficient?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is (will be) lacking?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q136 Regarding what educators (educational organizations) are doing to prepare a pipeline of skilled workers for companies to hire in the next four years (2015 - 2018):

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>What are they doing?</td>
<td></td>
</tr>
<tr>
<td>Will this be sufficient? In what way?</td>
<td></td>
</tr>
<tr>
<td>Will this be lacking? In what way?</td>
<td></td>
</tr>
</tbody>
</table>
Q137 Regarding what government organizations are doing to prepare a pipeline of skilled workers for companies to hire in the next four years (2015 - 2018):

<table>
<thead>
<tr>
<th>What are they doing? (That you are aware of)</th>
<th>Will this be sufficient? In what way?</th>
<th>Will this be lacking? In what way?</th>
</tr>
</thead>
</table>

Q138 How do companies meet workforce skill needs now? (in 2014) Rank order the top five, with 1 as the highest. Select and drag items to change their rank order.

- [ ] Hire employees with required skills
- [ ] Develop or train employees to learn required skills
- [ ] Hire contingent labor with required skills
- [ ] Hire consultants on a project basis
- [ ] Assign current employees to units or projects on a temporary basis
- [ ] Other
Q139 How will companies meet workforce skill needs in the next four years? (2015 - 2018) Rank order the top five, with 1 as the highest. Select and drag items to change their rank order.

______ Hire employees with required skills
______ Develop or train employees to learn required skills
______ Hire contingent labor with required skills
______ Hire consultants on a project basis
______ Assign current employees to units or projects on a temporary basis
______ Other

Q140 Regarding changes in the occupational skills that are most critical to students’ post-graduation success in the past five years (2009 - 2013):

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<tr>
<th>What has changed?</th>
<th>What drivers have caused the change?</th>
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</tbody>
</table>
Q141 Which occupational skills are most critical to students' post-graduation success now? (in 2014)

<table>
<thead>
<tr>
<th>Skill name or description</th>
<th>Title example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill #1</td>
<td></td>
</tr>
<tr>
<td>Skill #2</td>
<td></td>
</tr>
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<td>Skill #3</td>
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</tr>
<tr>
<td>Skill #4</td>
<td></td>
</tr>
<tr>
<td>Skill #5</td>
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</tbody>
</table>

Q142 Which occupational skills are most critical to students' post-graduation success in the next four years? (2015 - 2018)

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<td>Skill #4</td>
<td></td>
</tr>
<tr>
<td>Skill #5</td>
<td></td>
</tr>
</tbody>
</table>
Q143 Which occupational skills do companies outsource now? (in 2014)

<table>
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<tr>
<th>Skill #1</th>
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<th>Title example</th>
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</tr>
<tr>
<td>Skill #5</td>
<td></td>
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</tbody>
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Q144 Which occupational skills will companies outsource in the next four years? (2015 - 2018)

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<th>Title example</th>
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<td></td>
<td></td>
</tr>
<tr>
<td>Skill #5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q145 What types of education resources does your institution offer to provide companies with a pipeline of skilled workers to hire now? (in 2014) Rank order the top five. Select and drag items to change their rank order.

_____ Effective preparation of high school graduates
_____ Effective preparation of technical or vocational post-secondary graduates
_____ Effective preparation of two-year post-secondary graduates (Associate degrees)
_____ Effective preparation of four-year post-secondary graduates (Bachelor degrees)
_____ Effective preparation of graduate program graduates (Master degrees)
_____ Other (please describe)

Q146 What types of education resources will your institution offer to provide companies with a pipeline of skilled workers to hire in the next four years? (2015 - 2018) Rank order the top five. Select and drag items to change their rank order.

_____ Effective preparation of high school graduates
_____ Effective preparation of technical or vocational post-secondary graduates
_____ Effective preparation of two-year post-secondary graduates (Associate degrees)
_____ Effective preparation of four-year post-secondary graduates (Bachelor degrees)
_____ Effective preparation of graduate program graduates (Master degrees)
_____ Other (please describe)
Q147 What types of government resources do companies rely upon to provide a pipeline of skilled workers to hire now? (in 2014) Rank order the top five. Select and drag items to change their rank order.

______ Job centers
______ Job training programs
______ Policies related to workforce development
______ Policies related to education
______ Tax of other financial incentives
______ Other (please describe)

Q148 What types of government resources will companies rely upon to provide a pipeline of skilled workers to hire in the next four years? (2015 - 2018) Rank order the top five. Select and drag items to change their rank order.

______ Job centers
______ Job training programs
______ Policies related to workforce development
______ Policies related to education
______ Tax of other financial incentives
______ Other (please describe)
Q149 What types of education resources do (or will) companies use to develop their workforce? (Select all that apply)

<table>
<thead>
<tr>
<th>Education Resources</th>
<th>Now, in 2014?</th>
<th>In the next four years? (2015 - 2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training - internal providers</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Training - external providers / contract</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Workshop, seminar or conference attendance</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>On the job training</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Job rotation</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Job shadowing - formal</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Coaching or mentoring - formal</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Coaching or mentoring - informal</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Individual development planning</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Succession planning</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Tuition reimbursement - degree programs</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Tuition reimbursement</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>- technical or occupational courses</td>
<td>Online courses library provided by the organization</td>
<td>Professional membership or publication subscriptions paid</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>----------------------------------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>○</td>
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</tr>
</tbody>
</table>
Q150 What types of government resources do (or will) companies use to develop their workforce? (Select all that apply)

<table>
<thead>
<tr>
<th></th>
<th>Now, in 2014?</th>
<th>In the next four years? (2015 - 2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job training programs</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Tax incentives for providing training</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Workforce center resources</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Bureau of Labor Statistics (DOL) databases</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>and tools (such as the Occupational</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outlook Handbook or other resources)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State Department of Labor</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Other</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Q151 Looking to the future...How do you think globalization will affect your institution?

<table>
<thead>
<tr>
<th>In the next 10 years?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beyond 10 years?</td>
</tr>
</tbody>
</table>

Q152 How do you think globalization will affect your educational sector?

<table>
<thead>
<tr>
<th>In the next 10 years?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beyond 10 years?</td>
</tr>
</tbody>
</table>

Q153 What skills do you think students will need to succeed in the face of globalization?

<table>
<thead>
<tr>
<th>In the next 10 years?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beyond 10 years?</td>
</tr>
</tbody>
</table>
Q154   How do you think companies will obtain employees with the skills they need to compete effectively?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>In the next 10 years?</td>
<td></td>
</tr>
<tr>
<td>Beyond 10 years?</td>
<td></td>
</tr>
</tbody>
</table>

Q155 Do you have any other thoughts to share on globalization and employment in the Denver Metro Region?

Q7 Occupational Employment Challenges in a Globalizing Economy – Company Perspective  Thank you for participating in this survey. Your responses will be identified by code number only and will be kept separate from information that could identify you.
Q97 What industry does your company compete in?

- Accommodation and Food Services
- Administrative and Support Services (includes Business Services, Consulting, Waste Management)
- Agriculture, Forestry, Fishing and Hunting
- Arts, Entertainment, and Recreation
- Construction
- Educational Services
- Finance and Insurance
- Health Care and Social Assistance
- Information (includes Broadcasting, Data Services, Publishing, Telecommunications)
- Management of Companies and Enterprises
- Manufacturing
- Mining, Quarrying, and Oil and Gas Extraction
- Professional, Scientific, and Technical Services (includes Accounting, Advertising, Legal)
- Public Administration (includes Public Safety)
- Real Estate and Rental and Leasing
- Retail Trade
- Transportation and Warehousing
- Utilities
- Wholesale Trade

Q9 About your company and your role:

<table>
<thead>
<tr>
<th>Where is your company headquartered?</th>
</tr>
</thead>
<tbody>
<tr>
<td>If your company operates outside of Colorado, where does your company operate? (Please describe both physical and virtual operations.)</td>
</tr>
<tr>
<td>Please describe your job at this company.</td>
</tr>
</tbody>
</table>
Q8 Do you have responsibility for (check all that apply):

- Recruiting employees
- Hiring employees
- Developing employees (informally or formally, includes succession planning)
- Leading a revenue-generating business unit within the company
- Leading a shared services or functional unit within the company
- Leading a division or regional organization within the company
- Leading the company (executive management)
- Front line manager or supervisor
- Team lead (non-management)
- Individual contributor

Q12 Which of the descriptions below apply to your company? (Select all that apply)

- C Corporation
- Sole proprietorship
- Cooperative
- Partnership
- S Corporation (under 100 shareholders)
- Limited Liability Company (LLC)
- Single, establishment, Colorado only
- Multiple establishment, Colorado and US
- Multinational, US parent
- Multinational, non-US parent
- Privately owned
- Publicly traded
Q15 How many years has your company done business in Colorado?

- 0 to 3 years
- 4 to 6 years
- 7 to 10 years
- 11 to 20 years
- 21 to 50 years
- 51 to 70 years
- More than 70 years

Q16 How many employees does your company have in Colorado? (Not temporary or contingent workers)

- More than 10,000
- 5,000 to 10,000
- 1,000 to 4,999
- 500 to 999
- 100 to 499
- 50 to 99
- 10 to 49
- Less than 10

Q17 How many employees does your company employ in all US locations? (Not temporary or contingent workers)

- More than 10,000
- 5,000 to 10,000
- 1,000 to 4,999
- 500 to 999
- 100 to 499
- 50 to 99
- 10 to 49
- Less than 10
Q18 How many employees does your company employ in all non-US locations? (Not temporary or contingent workers)

- More than 10,000
- 5,000 to 10,000
- 1,000 to 4,999
- 500 to 999
- 100 to 499
- 50 to 99
- 10 to 49
- Less than 10

Q26 For your company, and the industry it competes in:

<table>
<thead>
<tr>
<th>How do you define globalization?</th>
<th>What are the key drivers of globalization for your industry?</th>
</tr>
</thead>
</table>

Q27 How is globalization affecting your industry?

<table>
<thead>
<tr>
<th>Now?</th>
<th>In the next four years? (2015 - 2018)</th>
</tr>
</thead>
</table>
Q28 How is globalization affecting your company?

<table>
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Q29 What skills did employees need before globalization reached the scale it has today?

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<th>In the industry your company competes in?</th>
</tr>
</thead>
</table>

Q30 What skills do employees need for your company to succeed in the face of globalization?

| Now? | In the next four year? (2015 - 2018) |
Q31 What are your company's greatest workforce challenges?

<table>
<thead>
<tr>
<th>Now?</th>
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</tr>
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Q32 What are your company's greatest workforce assets?

<table>
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<tr>
<th>Now?</th>
<th>In the next four year? (2015 - 2018)</th>
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</table>

Q33 What are the most innovative managers in your company doing to recruit, develop and retain people with the critical skills your company needs to be competitive?

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</thead>
</table>
Q34 How is your company responding to workforce challenges?

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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q36 Does (or will) the Denver Metropolitan Area labor market meet your workforce needs:

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Now? (in 2014)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the next four years? (2015 - 2018)</td>
<td>☒</td>
<td>☒</td>
</tr>
</tbody>
</table>

Q37 Regarding how the Denver Metropolitan Area labor market meets your workforce needs:

<table>
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<tr>
<th>What is (will be) sufficient?</th>
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<tr>
<td>What is (will be) lacking?</td>
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Q38 Regarding what educators (educational organizations) are doing to prepare a pipeline of skilled workers for your company to hire in the next four years (2015 - 2018):

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<tr>
<th>What are they doing? (That you are aware of)</th>
<th>Will this be sufficient? In what way?</th>
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Q51 Regarding what government organizations are doing to prepare a pipeline of skilled workers for your company to hire in the next four years (2015 - 2018):

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Q39 How does your company meet workforce skill needs now? (in 2014) Rank order the top five, with 1 as the highest. Select and drag items to change their rank order.

- [ ] Hire employees with required skills
- [ ] Develop or train employees to learn required skills
- [ ] Hire contingent labor with required skills
- [ ] Hire consultants on a project basis
- [ ] Assign current employees to units or projects on a temporary basis
- [ ] Other
Q40 How will your company meet workforce skill needs in the next four years? (2015 - 2018) Rank order the top five, with 1 as the highest. Select and drag items to change their rank order.

_____ Hire employees with required skills
_____ Develop or train employees to learn required skills
_____ Hire contingent labor with required skills
_____ Hire consultants on a project basis
_____ Assign current employees to units or projects on a temporary basis
_____ Other

Q42 Regarding changes in the occupational skills that are most critical to your company's competitive success in the past five years (2009 - 2013):

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Q43 Which occupational skills are most critical to your company’s competitive success now? (in 2014)

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<tr>
<th>Skill #1</th>
<th>Skill name or description</th>
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<tr>
<td>Skill #5</td>
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Q52 Which occupational skills are most critical to your company’s competitive success in the next four years? (2015 - 2018)

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</tr>
<tr>
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</table>
Q53 Which occupational skills does your company outsource now? (in 2014)

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<tbody>
<tr>
<td>Skill #2</td>
<td></td>
<td></td>
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<tr>
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<td>Skill #4</td>
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<tr>
<td>Skill #5</td>
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</tr>
</tbody>
</table>

Q54 Which occupational skills will your company outsource in the next four years? (2015 - 2018)

<table>
<thead>
<tr>
<th>Skill #1</th>
<th>Skill name or description</th>
<th>Title example</th>
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<tbody>
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</tbody>
</table>
Q45 What types of education resources does your company rely upon to provide a pipeline of skilled workers for you to hire now? (in 2014) Rank order the top five. Select and drag items to change their rank order.

_____ Effective preparation of high school graduates
_____ Effective preparation of technical or vocational post-secondary graduates
_____ Effective preparation of two-year post-secondary graduates (Associate degrees)
_____ Effective preparation of four-year post-secondary graduates (Bachelor degrees)
_____ Effective preparation of graduate program graduates (Master degrees)
_____ Other (please describe)

Q46 What types of education resources will your company rely upon to provide a pipeline of skilled workers for you to hire in the next four years? (2015 - 2018) Rank order the top five. Select and drag items to change their rank order.

_____ Effective preparation of high school graduates
_____ Effective preparation of technical or vocational post-secondary graduates
_____ Effective preparation of two-year post-secondary graduates (Associate degrees)
_____ Effective preparation of four-year post-secondary graduates (Bachelor degrees)
_____ Effective preparation of graduate program graduates (Master degrees)
_____ Other (please describe)
Q47 What types of government resources does your company rely upon to provide a pipeline of skilled workers for you to hire now? (in 2014) Rank order the top five. Select and drag items to change their rank order.

- _____ Job centers
- _____ Job training programs
- _____ Policies related to workforce development
- _____ Policies related to education
- _____ Tax of other financial incentives
- _____ Other (please describe)

Q49 What types of government resources will your company rely upon to provide a pipeline of skilled workers for you to hire in the next four years? (2015 - 2018) Rank order the top five. Select and drag items to change their rank order.

- _____ Job centers
- _____ Job training programs
- _____ Policies related to workforce development
- _____ Policies related to education
- _____ Tax of other financial incentives
- _____ Other (please describe)
Q50 What types of education resources does (or will) your company use to develop your workforce? (Select all that apply)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Training - internal providers</td>
<td>Yes</td>
<td>No</td>
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<td>Training - external providers / contract</td>
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<tr>
<td>Other</td>
<td></td>
<td></td>
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</tbody>
</table>
Q51 What types of government resources does (or will) your company use to develop your workforce? (Select all that apply)

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Now, in 2014?</th>
<th>In the next four years? (2015 - 2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job training programs</td>
<td>Yes</td>
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<td>Tax incentives for providing training</td>
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<td>No</td>
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<td>Workforce center resources</td>
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<td>Bureau of Labor Statistics (DOL) data bases and tools (such as the Occupational Outlook Handbook or other resources)</td>
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<tr>
<td>State Department of Labor</td>
<td>Yes</td>
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</tr>
<tr>
<td>Other</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Q52 Looking to the future...How do you think globalization will affect your company?

<table>
<thead>
<tr>
<th>Timeframe</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>In the next 10 years?</td>
<td></td>
</tr>
<tr>
<td>Beyond 10 years?</td>
<td></td>
</tr>
</tbody>
</table>
Q55 How do you think globalization will affect your industry?

<table>
<thead>
<tr>
<th>In the next 10 years?</th>
<th>Beyond 10 years?</th>
</tr>
</thead>
</table>

Q56 What skills do you think employees will need for companies in your industry to succeed in the face of globalization?

<table>
<thead>
<tr>
<th>In the next 10 years?</th>
<th>Beyond 10 years?</th>
</tr>
</thead>
</table>

Q57 How do you think companies will obtain employees with the skills they need to compete effectively?

<table>
<thead>
<tr>
<th>In the next 10 years?</th>
<th>Beyond 10 years?</th>
</tr>
</thead>
</table>

Q98 Do you have any other thoughts to share on globalization and employment in the Denver Metro Region?
Q156 Occupational Employment Challenges in a Globalizing Economy – Government and Non-Profit Perspective  Thank you for participating in this survey. Your responses will be identified by code number only and will be kept separate from information that could identify you.

Q157 What industries have the largest footprint (are the most influential in terms of employment) in the Denver Metropolitan Region? (Select all that apply.)

☐ Accommodation and Food Services
☐ Administrative and Support Services (includes Business Services, Consulting, Waste Management)
☐ Agriculture, Forestry, Fishing and Hunting
☐ Arts, Entertainment, and Recreation
☐ Construction
☐ Educational Services
☐ Finance and Insurance
☐ Health Care and Social Assistance
☐ Information (includes Broadcasting, Data Services, Publishing, Telecommunications)
☐ Management of Companies and Enterprises
☐ Manufacturing
☐ Mining, Quarrying, and Oil and Gas Extraction
☐ Professional, Scientific, and Technical Services (includes Accounting, Advertising, Legal)
☐ Public Administration (includes Public Safety)
☐ Real Estate and Rental and Leasing
☐ Retail Trade
☐ Transportation and Warehousing
☐ Utilities
☐ Wholesale Trade
Q158 About your organization and your role:

<table>
<thead>
<tr>
<th>What is your organization's mission?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Where is your organization headquartered?</td>
<td></td>
</tr>
<tr>
<td>If your organization operates outside of Colorado, where does your organization operate? (Please describe both physical and virtual operations.)</td>
<td></td>
</tr>
<tr>
<td>Please describe your role at this organization.</td>
<td></td>
</tr>
</tbody>
</table>

Q159 Do you have responsibility for (check all that apply):

- Recruiting employees
- Hiring employees
- Developing employees (informally or formally, includes succession planning)
- Leading a shared services or functional unit within the organization
- Leading a division or regional organization within the organization
- Leading the organization (executive management)
- Other
Q160 Which of the descriptions below apply to your organization? (Select all that apply)

☐ Non-profit
☐ Public sector
☐ Local government
☐ State government
☐ National government
☐ Local non-profit
☐ State non-profit
☐ National non-profit
☐ International non-profit
☐ Multiple locations, Colorado
☐ Multiple locations, Colorado and US

Q161 How many years has your organization operated in Colorado?

☐ 0 to 3 years
☐ 4 to 6 years
☐ 7 to 10 years
☐ 11 to 20 years
☐ 21 to 50 years
☐ 51 to 70 years
☐ More than 70 years

Q162 How many employees does your organization have in Colorado? (Not temporary or contingent workers)

☐ More than 10,000
☐ 5,000 to 10,000
☐ 1,000 to 4,999
☐ 500 to 999
☐ 100 to 499
☐ 50 to 99
☐ 10 to 49
☐ Less than 10
Q163 How many employees does your organization employ in all US locations? (Not temporary or contingent workers)

- More than 10,000
- 5,000 to 10,000
- 1,000 to 4,999
- 500 to 999
- 100 to 499
- 50 to 99
- 10 to 49
- Less than 10

Q164 How many employees does your organization employ in all non-US locations? (Not temporary or contingent workers)

- More than 10,000
- 5,000 to 10,000
- 1,000 to 4,999
- 500 to 999
- 100 to 499
- 50 to 99
- 10 to 49
- Less than 10

Q170 For your organization, and the mission it serves:

<table>
<thead>
<tr>
<th>How do you define globalization?</th>
<th>What are the key drivers of globalization for your organization?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>
Q171 How is globalization affecting government (non-profit) institutions?

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>Now?</td>
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<tr>
<td></td>
<td>In the next four years? (2015 - 2018)</td>
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</table>

Q172 How is globalization affecting your organization?

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<td>Now?</td>
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<td>In the next four years? (2015 - 2018)</td>
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</table>

Q173 What skills did employees need before globalization reached the scale it has today?

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<table>
<thead>
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</thead>
<tbody>
<tr>
<td></td>
<td>At your organization?</td>
</tr>
<tr>
<td></td>
<td>In the sector your organization belongs to?</td>
</tr>
</tbody>
</table>

Q174 What skills do employees need to succeed in the face of globalization?

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>Now?</td>
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<tr>
<td></td>
<td>In the next four years? (2015 - 2018)</td>
</tr>
</tbody>
</table>
Q175 What are the Denver Metro Region's greatest workforce challenges?

<table>
<thead>
<tr>
<th>Now?</th>
<th>In the next four years? (2015 - 2018)</th>
</tr>
</thead>
</table>

Q176 What are the Denver Metro Region's greatest workforce assets?

<table>
<thead>
<tr>
<th>Now?</th>
<th>In the next four years? (2015 - 2018)</th>
</tr>
</thead>
</table>

Q177 What are the most innovative public (non-profit) organizations in the Denver Metro Region doing to help companies recruit, develop and retain people with the critical skills they need to be competitive?

<table>
<thead>
<tr>
<th>Now?</th>
<th>In the future?</th>
</tr>
</thead>
</table>
Q178 How is your organization helping companies respond to workforce challenges?

<table>
<thead>
<tr>
<th></th>
<th>Now? (in 2014)</th>
<th>In the next four years? (2015 - 2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Q179 Will the Denver Metropolitan Region labor market meet companies' workforce needs...

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Now? (in 2014)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>In the next four years? (2015 - 2018)</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Q180 Regarding how the Denver Metropolitan Area labor market meets companies' workforce needs:

<table>
<thead>
<tr>
<th></th>
<th>Now, in 2014?</th>
<th>In the next four years? (2015 - 2018)</th>
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<tr>
<td></td>
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</tbody>
</table>

What is (will be) sufficient?  
What is (will be) lacking?
Q181 Regarding what educators (educational organizations) are doing to prepare a pipeline of skilled workers for companies to hire in the next four years (2015 - 2018):

<table>
<thead>
<tr>
<th>What are they doing?</th>
<th>Will this be sufficient? In what way?</th>
<th>Will this be lacking? In what way?</th>
</tr>
</thead>
</table>

Q182 Regarding what government (non-profit) organizations are doing to prepare a pipeline of skilled workers for companies to hire in the next four years (2015 - 2018):

<table>
<thead>
<tr>
<th>What are they doing?</th>
<th>Will this be sufficient? In what way?</th>
<th>Will this be lacking? In what way?</th>
</tr>
</thead>
</table>
Q183 How do companies meet workforce skill needs now? (in 2014) Rank order the top five, with 1 as the highest. Select and drag items to change their rank order.

_____ Hire employees with required skills
_____ Develop or train employees to learn required skills
_____ Hire contingent labor with required skills
_____ Hire consultants on a project basis
_____ Assign current employees to units or projects on a temporary basis
_____ Other

Q184 How will companies meet workforce skill needs in the next four years? (2015 - 2018) Rank order the top five, with 1 as the highest. Select and drag items to change their rank order.

_____ Hire employees with required skills
_____ Develop or train employees to learn required skills
_____ Hire contingent labor with required skills
_____ Hire consultants on a project basis
_____ Assign current employees to units or projects on a temporary basis
_____ Other

Q185 Regarding changes in the occupational skills that are most critical to companies' competitive success, in the past five years (2009 - 2013):

<table>
<thead>
<tr>
<th>What has changed?</th>
<th>What drivers have caused the change?</th>
</tr>
</thead>
</table>

237
Q186 Which occupational skills are most critical to companies' competitive success now? (in 2014)

<table>
<thead>
<tr>
<th>Skill #1</th>
<th>Skill name or description</th>
<th>Title example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill #2</td>
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<td>Skill #3</td>
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<td>Skill #5</td>
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</table>

Q187 Which occupational skills are most critical to companies' competitive success in the next four years? (2015 - 2018)

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<th>Skill #1</th>
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Q188 Which occupational skills do companies outsource now? (in 2014)

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<td>Skill #5</td>
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Q189 Which occupational skills will companies outsource in the next four years? (2015 - 2018)

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</table>
Q190 What types of education resources do educational institutions offer to provide companies with a pipeline of skilled workers to hire now? (in 2014) Rank order the top five. Select and drag items to change their rank order.

_____ Effective preparation of high school graduates
_____ Effective preparation of technical or vocational post-secondary graduates
_____ Effective preparation of two-year post-secondary graduates (Associate degrees)
_____ Effective preparation of four-year post-secondary graduates (Bachelor degrees)
_____ Effective preparation of graduate program graduates (Master degrees)
_____ Other (please describe)

Q191 What types of education resources will educational institutions offer to provide companies with a pipeline of skilled workers to hire in the next four years? (2015 - 2018) Rank order the top five. Select and drag items to change their rank order.

_____ Effective preparation of high school graduates
_____ Effective preparation of technical or vocational post-secondary graduates
_____ Effective preparation of two-year post-secondary graduates (Associate degrees)
_____ Effective preparation of four-year post-secondary graduates (Bachelor degrees)
_____ Effective preparation of graduate program graduates (Master degrees)
_____ Other (please describe)
Q192 What types of government resources do companies rely upon to provide a pipeline of skilled workers to hire now? (in 2014) Rank order the top five. Select and drag items to change their rank order.

____ Job centers
____ Job training programs
____ Policies related to workforce development
____ Policies related to education
____ Tax of other financial incentives
____ Other (please describe)

Q193 What types of government resources will companies rely upon to provide a pipeline of skilled workers to hire in the next four years? (2015 - 2018) Rank order the top five. Select and drag items to change their rank order.

____ Job centers
____ Job training programs
____ Policies related to workforce development
____ Policies related to education
____ Tax of other financial incentives
____ Other (please describe)
Q194 What types of education resources do (or will) companies use to develop their workforce? (Select all that apply)

<table>
<thead>
<tr>
<th>Education Resources</th>
<th>Now, in 2014?</th>
<th>Yes</th>
<th>No</th>
<th>In the next four years? (2015 - 2018)</th>
<th>Yes</th>
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Q195 What types of government resources do (or will) companies use to develop their workforce? (Select all that apply)

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</table>

Q196 Looking to the future...How do you think globalization will affect your organization?

<table>
<thead>
<tr>
<th></th>
<th>In the next 10 years?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beyond 10 years?</td>
</tr>
</tbody>
</table>
Q197 How do you think globalization will affect your sector?

<table>
<thead>
<tr>
<th></th>
<th>In the next 10 years?</th>
<th>Beyond 10 years?</th>
</tr>
</thead>
</table>

Q198 What skills do you think employees will need for companies to succeed in the face of globalization?

<table>
<thead>
<tr>
<th></th>
<th>In the next 10 years?</th>
<th>Beyond 10 years?</th>
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</thead>
</table>

Q199 How do you think companies will obtain employees with the skills they need to compete effectively?

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<tr>
<th></th>
<th>In the next 10 years?</th>
<th>Beyond 10 years?</th>
</tr>
</thead>
</table>

Q200 Do you have any other thoughts to share on globalization and employment in the Denver Metro Region?
Q201 Occupational Employment Challenges in a Globalizing Economy – Consultant or Business Services Provider Perspective Thank you for participating in this survey. Your responses will be identified by code number only and will be kept separate from information that could identify you.

Q202 What industries have the largest footprint (are the most influential in terms of employment) in the Denver Metropolitan Region? (Select all that apply.)

- Accommodation and Food Services
- Administrative and Support Services (includes Business Services, Consulting, Waste Management)
- Agriculture, Forestry, Fishing and Hunting
- Arts, Entertainment, and Recreation
- Construction
- Educational Services
- Finance and Insurance
- Health Care and Social Assistance
- Information (includes Broadcasting, Data Services, Publishing, Telecommunications)
- Management of Companies and Enterprises
- Manufacturing
- Mining, Quarrying, and Oil and Gas Extraction
- Professional, Scientific, and Technical Services (includes Accounting, Advertising, Legal)
- Public Administration (includes Public Safety)
- Real Estate and Rental and Leasing
- Retail Trade
- Transportation and Warehousing
- Utilities
- Wholesale Trade
Q203 About your organization and your role:

<table>
<thead>
<tr>
<th>What is your organization's mission?</th>
<th>Where is your organization headquartered?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If your organization operates outside of Colorado, where does your organization operate? (Please describe both physical and virtual operations.)</td>
</tr>
<tr>
<td></td>
<td>Please describe your role at this organization.</td>
</tr>
</tbody>
</table>

Q204 Do you have responsibility for (check all that apply):

- Recruiting employees
- Hiring employees
- Developing employees (informally or formally, includes succession planning)
- Leading a revenue-generating business unit within the organization
- Leading a shared services or functional unit within the organization
- Leading a division or regional organization within the organization
- Leading the organization (executive management)
- Business development
- Business services delivery
- Other
Q205 Which of the descriptions below apply to your organization? (Select all that apply)

- C Corporation
- Sole proprietorship
- Cooperative
- Partnership
- S Corporation
- Limited Liability Company (LLC)
- Single establishment, Colorado
- Multiple establishment, Colorado and US
- Multinational, US parent
- Multinational, non-US parent
- Privately owned
- Publicly traded

Q206 How many years has your organization operated in Colorado?

- 0 to 3 years
- 4 to 6 years
- 7 to 10 years
- 11 to 20 years
- 21 to 50 years
- 51 to 70 years
- More than 70 years

Q207 How many employees does your organization have in Colorado? (Not temporary or contingent workers)

- More than 10,000
- 5,000 to 10,000
- 1,000 to 4,999
- 500 to 999
- 100 to 499
- 50 to 99
- 10 to 49
- Less than 10
Q208 How many employees does your organization employ in all US locations? (Not temporary or contingent workers)

- More than 10,000
- 5,000 to 10,000
- 1,000 to 4,999
- 500 to 999
- 100 to 499
- 50 to 99
- 10 to 49
- Less than 10

Q209 How many employees does your organization employ in all non-US locations? (Not temporary or contingent workers)

- More than 10,000
- 5,000 to 10,000
- 1,000 to 4,999
- 500 to 999
- 100 to 499
- 50 to 99
- 10 to 49
- Less than 10

Q215 For your clients, and the industries they compete in:

<table>
<thead>
<tr>
<th>How do you define globalization?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>What are the key drivers of globalization for the industries your clients compete in?</td>
</tr>
</tbody>
</table>
Q216 How is globalization affecting the industries your clients compete in?

| Now? | In the next four years? (2015 - 2018) |

Q217 How is globalization affecting your clients?

| Now? | In the next four years? (2015 - 2018) |

Q218 What skills did employees need before globalization reached the scale it has today?

| For your clients? | In the industries your clients compete in? |

Q219 What skills do employees need for your clients to succeed in the face of globalization?

| Now? | In the next four years? (2015 - 2018) |
Q220 What are your clients' greatest workforce challenges?

| Now? | In the next four years? (2015 - 2018) |

Q221 What are your clients' greatest workforce assets?

| Now? | In the next four years? (2015 - 2018) |

Q222 What are your clients' most innovative managers doing to help companies recruit, develop and retain people with the critical skills they need to be competitive?

| Now? | In the future? |

Q223 How are your clients responding to workforce challenges?

| Now? (in 2014) | In the next four years? (2015 - 2018) |
Q224 Will the Denver Metropolitan Region labor market meet your clients' workforce needs...

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Now? (in 2014)</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>In the next four years? (2015 - 2018)</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

Q225 Regarding how the Denver Metropolitan Area labor market meets your clients' workforce needs:

<table>
<thead>
<tr>
<th>What is (will be) sufficient?</th>
<th>Now, in 2014?</th>
<th>In the next four years? (2015 - 2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is (will be) lacking?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q226 Regarding what educators (educational organizations) are doing to prepare a pipeline of skilled workers for your clients to hire in the next four years (2015 - 2018):

<table>
<thead>
<tr>
<th>What are they doing?</th>
<th>Will this be sufficient? In what way?</th>
<th>Will this be lacking? In what way?</th>
</tr>
</thead>
</table>
Q227 Regarding what government (non-profit) organizations are doing to prepare a pipeline of skilled workers for your clients to hire in the next four years (2015 - 2018):

<table>
<thead>
<tr>
<th>What are they doing?</th>
<th>Will this be sufficient? In what way?</th>
<th>Will this be lacking? In what way?</th>
</tr>
</thead>
</table>

Q228 How do your clients meet workforce skill needs now? (in 2014) Rank order the top five, with 1 as the highest. Select and drag items to change their rank order.

- [ ] Hire employees with required skills
- [ ] Develop or train employees to learn required skills
- [ ] Hire contingent labor with required skills
- [ ] Hire consultants on a project basis
- [ ] Assign current employees to units or projects on a temporary basis
- [ ] Other
Q229 How will your clients meet workforce skill needs in the next four years? (2015 - 2018) Rank order the top five, with 1 as the highest. Select and drag items to change their rank order.

- Hire employees with required skills
- Develop or train employees to learn required skills
- Hire contingent labor with required skills
- Hire consultants on a project basis
- Assign current employees to units or projects on a temporary basis
- Other

Q230 Regarding changes in the occupational skills that are most critical to your clients' competitive success, in the past five years (2009 - 2013):

<table>
<thead>
<tr>
<th>What has changed?</th>
<th>What drivers have caused the change?</th>
</tr>
</thead>
</table>


Q231 Which occupational skills are most critical to your clients' competitive success now? (in 2014)

<table>
<thead>
<tr>
<th>Skill name or description</th>
<th>Title example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill #1</td>
<td></td>
</tr>
<tr>
<td>Skill #2</td>
<td></td>
</tr>
<tr>
<td>Skill #3</td>
<td></td>
</tr>
<tr>
<td>Skill #4</td>
<td></td>
</tr>
<tr>
<td>Skill #5</td>
<td></td>
</tr>
</tbody>
</table>

Q232 Which occupational skills are most critical to your clients' competitive success in the next four years? (2015 - 2018)

<table>
<thead>
<tr>
<th>Skill name or description</th>
<th>Title example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill #1</td>
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<tr>
<td>Skill #3</td>
<td></td>
</tr>
<tr>
<td>Skill #4</td>
<td></td>
</tr>
<tr>
<td>Skill #5</td>
<td></td>
</tr>
</tbody>
</table>
Q233 Which occupational skills do your clients outsource now? (in 2014)

<table>
<thead>
<tr>
<th>Skill #1</th>
<th>Skill name or description</th>
<th>Title example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill #2</td>
<td></td>
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<tr>
<td>Skill #3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill #4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill #5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q234 Which occupational skills will your clients outsource in the next four years? (2015 - 2018)

<table>
<thead>
<tr>
<th>Skill #1</th>
<th>Skill name or description</th>
<th>Title example</th>
</tr>
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<tbody>
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<td></td>
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<td>Skill #4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill #5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q235 What types of education resources do educational institutions offer to provide your clients with a pipeline of skilled workers to hire now? (in 2014) Rank order the top five. Select and drag items to change their rank order.

_____ Effective preparation of high school graduates
_____ Effective preparation of technical or vocational post-secondary graduates
_____ Effective preparation of two-year post-secondary graduates (Associate degrees)
_____ Effective preparation of four-year post-secondary graduates (Bachelor degrees)
_____ Effective preparation of graduate program graduates (Master degrees)
_____ Other (please describe)

Q236 What types of education resources will educational institutions offer to provide your clients with a pipeline of skilled workers to hire in the next four years? (2015 - 2018) Rank order the top five. Select and drag items to change their rank order.

_____ Effective preparation of high school graduates
_____ Effective preparation of technical or vocational post-secondary graduates
_____ Effective preparation of two-year post-secondary graduates (Associate degrees)
_____ Effective preparation of four-year post-secondary graduates (Bachelor degrees)
_____ Effective preparation of graduate program graduates (Master degrees)
_____ Other (please describe)
Q237 What types of government resources do your clients rely upon to provide a pipeline of skilled workers to hire now? (in 2014) Rank order the top five. Select and drag items to change their rank order.

______ Job centers
______ Job training programs
______ Policies related to workforce development
______ Policies related to education
______ Tax of other financial incentives
______ Other (please describe)

Q238 What types of government resources will your clients rely upon to provide a pipeline of skilled workers to hire in the next four years? (2015 - 2018) Rank order the top five. Select and drag items to change their rank order.

______ Job centers
______ Job training programs
______ Policies related to workforce development
______ Policies related to education
______ Tax of other financial incentives
______ Other (please describe)
Q239 What types of education resources do (or will) your clients use to develop their workforce? (Select all that apply)

<table>
<thead>
<tr>
<th></th>
<th>Now, in 2014?</th>
<th>In the next four years? (2015 - 2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training - internal providers</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Training - external providers / contract</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Workshop, seminar or conference attendance</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>On the job training</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Job rotation</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Job shadowing - formal</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Coaching or mentoring - formal</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Coaching or mentoring - informal</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Individual development planning</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Succession planning</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Tuition reimbursement - degree programs</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Tuition reimbursement - technical or occupational courses</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Online courses library provided by the organization</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Professional membership or publication subscriptions paid</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Release time to pursue professional development or learning activities</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Other</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

258
Q240 What types of government resources do (or will) your clients use to develop their workforce? (Select all that apply)

<table>
<thead>
<tr>
<th>Resources</th>
<th>Now, in 2014?</th>
<th>No</th>
<th>In the next four years? (2015 - 2018)</th>
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</thead>
<tbody>
<tr>
<td>Job training programs</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Tax incentives for providing training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workforce center resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bureau of Labor Statistics (DOL) data bases and tools (such as the Occupational Outlook Handbook or other resources)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State Department of Labor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q241 Looking to the future...How do you think globalization will affect your business?

<table>
<thead>
<tr>
<th></th>
<th>In the next 10 years?</th>
<th>Beyond 10 years?</th>
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</thead>
<tbody>
<tr>
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Q242 How do you think globalization will affect your clients?

<table>
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<tr>
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Q243 What skills do you think employees will need for your clients to succeed in the face of globalization?

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Q244 How do you think your clients will obtain employees with the skills they need to compete effectively?

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</table>

Q245 Do you have any other thoughts to share on globalization and employment in the Denver Metro Region?
Q59 Thank you for participating in this survey!

** Please be sure to click the "Next" arrows (>>) at the bottom of this page and the next one to be sure your survey is marked as completed. **

If you have any questions, please contact me at sharon.gabel@du.edu.

As a reminder, your responses will be identified by code number only and will be kept separate from information that could identify you.

I appreciate any referrals you are able to give. Who else do you think I should speak with about workforce challenges in a globalizing economy?

Note: An email introduction will be very helpful in connecting me with individuals you think will have valuable information on this topic.

If you are able to send an email regarding this study, please copy me on the email, and I will respond to the person you are referring. If you prefer referring individuals personally, please direct them to the survey link at: http://tinyurl.com/GlobalizingDenverJobs

Or, list their names and email addresses below. I will reach out to them about this study, and ask if they are willing to participate in this survey.

Thank you - I greatly appreciate it!

<table>
<thead>
<tr>
<th>Referral #</th>
<th>Name</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referral #1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Referral #2</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Referral #5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q60 If you are willing for me to contact you with follow-up questions to this survey, please enter your preferred email address or phone number below. And, if you would like a summary of the results of this study to be sent to you, please provide your email address.

<table>
<thead>
<tr>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone #</td>
</tr>
<tr>
<td>If you would like a summary of survey results, please provide your email address</td>
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</table>