Texas A&M Transportation Institute

Identifying the Transportation Preferences of a Highly Skilled Workforce

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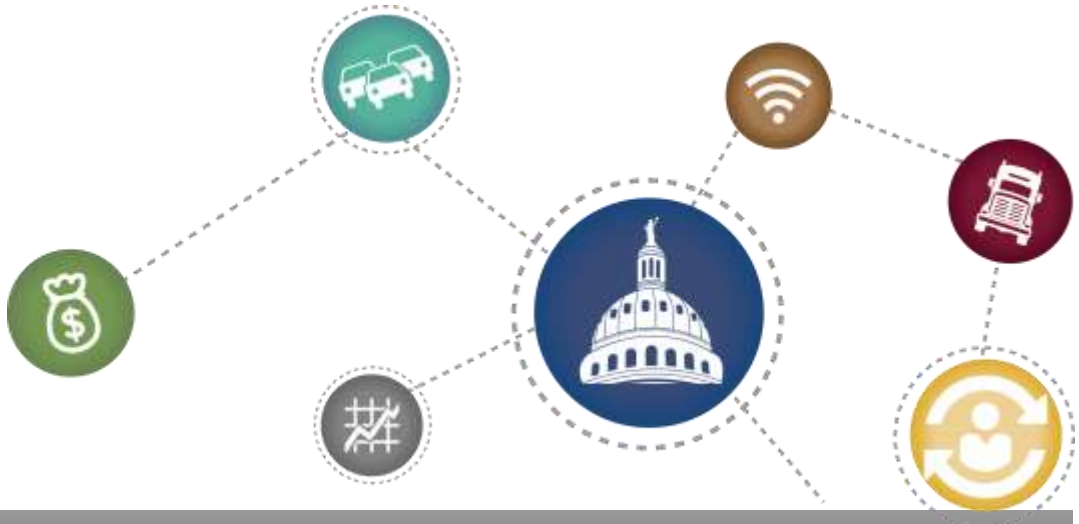

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Identifying the Transportation Preferences of a Highly Skilled Workforce

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Identifying the Transportation Preferences of a Highly Skilled Workforce

As they compete to attract highly skilled workers, more employers are focusing on recruitment strategies that address the transportation needs and preferences of those workers. This report examines related issues, and several observations can be drawn from the research.

- Access to a highly skilled workforce ranks at or near the top of the list of factors cited in business location or relocation decisions.
- The skill sets required for new jobs are changing rapidly, creating a gap between educational preparation and job readiness, and more fierce competition for employees with advanced abilities.
- The range of occupations which require advanced skills varies widely, encompassing both blue-collar and white-collar jobs; the industry sectors considered in the course of this study included:
    - Advanced technologies and manufacturing
    - Aerospace and defense
    - Information and computer technology
    - Biotechnology and life sciences
    - Energy – traditional and renewable
- For industries in which recruiting highly skilled workers is more competitive, transportation is more important.
- Transportation is an important quality-of-life issue for highly skilled job candidates, but it is not necessarily a "deal-breaker."
- Recruiters are of aware of the transportation conditions in Texas; if those conditions worsen, challenges faced by those recruiters will become greater.
- Recruiters view transit as a potential recruiting tool, but they do not suggest that highly skilled workers prefer this transportation mode.
- When possible, flexible work schedules and telecommuting opportunities are used as standard recruiting tools for highly skilled workers.
- Access to major air travel hubs is important in recruiting highly skilled workers.
- Understanding how highly skilled workers view transportation issues can help to inform future policy discussions on those issues.

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Executive Summary

Economic development professionals cite access to a highly skilled workforce as being one of, if not the most, important factors that businesses cite when choosing where to locate. This is because the United States, including Texas, is experiencing high demand in fields that require highly skilled workers. In addition, with recent and continual advancements in technology, there is a gap between educational preparation and job readiness. This skills gap in the workforce has resulted in greater competition among employers to land highly skilled and highly sought after employees. In order to compete for these employees, some employers are focusing on recruitment strategies that create attractive work environments to highly skilled workers. This report identifies the transportation preferences and needs of highly skilled workers that currently work in Texas, as well as those being actively recruited to join companies in Texas.

In order to identify the transportation preferences of highly skilled workers, researchers interviewed a range of human resource and recruitment professionals in fields that rely on this segment of the workforce. Those industries include:

- Advanced technologies and manufacturing.
- Aerospace and defense.
- Biotechnology and life sciences.
- Information and computer technology.
- Energy (traditional and renewables).

Researchers asked interviewees a wide range of questions regarding transportation, including the following:

- Whether prospects for highly skilled positions asked about congestion, parking, or the availability of different modes.
- If and how transportation impacts the quality of life or housing decisions of highly skilled recruits.
- How Texas is perceived as both competitive and non-competitive with respect to the recruitment of highly skilled workers.

The following is a summary of the key findings from interviews.

For Industries Where Recruiting Highly Skilled Workers Is More Competitive, Transportation Is More Important

Interviewees from the biotechnology/life sciences and the information/computer technology industries indicated that recruiting highly skilled talent within their fields is extremely competitive. Therefore, these industries focus on recruiting strategies that provide the highest

quality of life for potential employees. Interviewees from these industries indicated that transportation was a factor that impacts quality of life, and to that end, transportation plays a role in their ability to recruit and retain highly skilled workers.

Transportation Impacts Quality of Life for Highly Skilled Candidates, but It Is Not Currently a Deal-Breaker

Interviewees from the biotech/life sciences and tech industries who indicated that transportation and its impact on quality of life was a factor in their recruiting strategies provided a range of information about how transportation plays a part in how they position their companies to attract highly skilled candidates. Interviewees indicated that a range of factors such as workplace culture, job location (both the city and location within the city), and job place amenities contribute to quality of life. While interviewees indicated that transportation is a significant contributor to a candidate's potential quality of life, it is only one piece of the puzzle.

Recruiters View Transit as a Potential Recruiting Tool, Though They Gave No Indication That Highly Skilled Workers Prefer This Mode of Transportation

When asked what the State of Texas needs to do about transportation to make it easier to recruit and retain highly skilled workers, the majority of interviewees indicated that improved or expanded high-capacity public transportation (primarily intra and inter-city rail) would make it easier to recruit highly skilled workers. When asked why this was, most interviewees indicated that this type of transit could be used as a recruiting tool (especially if the company had direct access to it). However, when asked if they thought that highly skilled workers would prefer to use this type of transportation over other modes, interviewees indicated they had no reason to believe that; and moreover, some recruiters indicated that because highly skilled workers are often highly compensated, they would be less likely to need to use an alternative mode of transportation, as they are more likely to afford their own vehicle.

When Possible, Flexible Schedules and Telecommute Opportunities Are Standard Recruiting Tools for Highly Skilled Workers

Most interviewees indicated that they offer highly skilled workers the ability to have flexible schedules and telecommute options as a recruiting tool. This was especially true in the information and computer technology industry. While interviewees explained that some positions are not conducive to working remotely or having a flexible schedule, most interviewees indicated that this was something that was increasingly expected from highly skilled workers. In addition, interviewees in major metros acknowledged that these incentives were directly aimed at providing highly skilled workers the ability to avoid long commutes.

Access to Major Hubs for Air Travel an Important Aspect of Recruiting Highly Skilled Workers

Research suggests that access to airports is an important aspect of recruiting highly skilled workers. While interviewees did not indicate this was an aspect of the transportation system that impacted their ability to recruit highly skilled workers, researchers noted that all of the companies interviewed were located in metropolitan areas with access to major hubs for air transport.

Introduction

With more than 50 Fortune 500 companies located in Texas and a strong state economy, understanding how transportation in the state impacts business recruitment and retention of highly skilled workers is crucial to ensuring transportation needs are met and that economic growth continues. Economic development professionals consider access to a highly skilled workforce as being one of, if not the most, important factors that businesses cite when choosing where to locate. Knowing the transportation preferences of a highly skilled workforce and how state government policies can support them can help to ensure the long term economic competitiveness of the state.

The Texas A&M Transportation Institute's (TTI) Policy Research Center conducted a research project to identify how transportation impacts the recruitment and retention of highly skilled workers to the state of Texas. This report provides the findings of this research organized into the following sections:

- Background: provides information about the research project.
- Literature Review: documents existing research about the highly skilled workforce, including the highly skilled worker gap in the workforce; the definition of what constitutes highly skilled workers; what occupations are considered highly skilled; what the educational requirements of a highly skilled workforce are; and what research exists regarding the transportation preferences and needs of highly skilled workers.
- Programs and Policies: documents current policy efforts both nationally and within Texas regarding the attraction, development, and retention of a highly skilled workforce.
- Findings from Interviews with Employers of Highly Skilled Workers: provides the methodology, discussion guide, and findings from interviewing human resource and recruiting professionals from a range of companies located in Texas regarding the recruitment and retention of highly skilled workers.
- Key Findings: summarizes the key findings of the report.

Background

This research expands on the foundational research conducted by TTI's Policy Research Center, which identified the importance of the transportation system in Texas on the recruitment and retention of businesses within the following six key industry sectors:

- Advanced technologies and manufacturing.
- Aerospace and defense.
- Biotechnology and life sciences.

- Information and computer technology.
- Petroleum refining and chemical products.
- Energy.

One of the key findings of that research was that transportation is used by industries in two ways: 1) movement of human resources and 2) movement of goods. For those industries that rely on highly skilled labor, proximity to a qualified labor market is cited as just as important, if not more important than the movement of goods when deciding where to locate their business (*1*).

One metric used to assess the attractiveness of a region is quality of life. Transportation has been identified by numerous studies as an important determinant of quality of life (*2,3,4*). Based on the correlation between quality of life and transportation, researchers sought to determine how transportation contributes to the quality of the lives of highly skilled workers by identifying what aspects of the transportation system are most important to their quality of life. This report focuses on the transportation needs and preferences of highly skilled workers in the following five industry sectors (note that these five industry sectors below are slightly different than those noted above):

- Advanced technologies and manufacturing.
- Aerospace and defense.
- Biotechnology and life sciences.
- Information and computer technology.
- Energy (traditional and renewables).

Literature Review

This section will provide insight on the gap that exists between highly skilled positions and highly skilled workers in the United States, as well as provide an overview of what defines a highly skilled worker within each of the five industries identified above.

The Gap between Highly Skilled Positions and Workers in the United States

The United States is experiencing high demand in fields that require highly skilled workers. With recent and continual advancements in technology, the skills needed to conduct existing jobs are rapidly changing, and new occupations are being created that require increasingly educated and well trained workers (*5*). There is a gap between educational preparation and job readiness. While most United States educational institutions feel that they are preparing students for employment, only a third of employers feel they are receiving applicants that are job ready (*6*). This has created a skills gap in the workforce, which has resulted in greater competition among

employers to land highly skilled and highly sought after employees. One area that employers focus on to ensure that they can compete for these workers is how attractive their work environments are to highly skilled workers (*7,8*). This report will explore what role transportation plays in creating attractive work environments.

What Defines a Highly Skilled Worker?

Researchers found that, while the terms "highly skilled worker" or "highly skilled labor" are commonly used by educators and governments, the literature reviewed cited the lack of an agreed upon definition and noted that highly skilled workers do not constitute a homogenous group (*9, 10, 11*). Nevertheless, two broad definitions emerged. A highly skilled worker may be someone with extensive academic training, (e.g., advanced post-secondary or professional degree often in the STEM disciplines of science, technology, engineering, and mathematics) (*9, 11*), or someone with occupation-specific, on-the-job training, which in some cases leads to an occupational certification (*9, 11*).

Occupations and Education

There are a range of occupations that require highly skilled workers, from traditionally blue collar jobs such as automotive manufacturers, whose employees must develop specific skills using advanced technologies through experience and training programs (*12*), to computer system designers, who require advanced post-secondary degrees (*13*). As educational attainment is a primary distinction between these two types of highly skilled workers, it is important to distinguish why some highly skilled occupations do not require formal education, and others do. The occupations that require hands-on experience as opposed to formal education do so because technology in certain fields (e.g., advanced manufacturing) changes rapidly, requiring workers to continually adapt to advances in technology, and learn new technologies as they are developed. In this example, formal education cannot account for what is learned through hands-on experience.

Conversely, other occupations, such as a control systems engineer, who designs, installs and maintains control systems that run a manufacturing plant, require extensive formal education and attainment of advanced degrees within their field. This occupation requires that an individual have expertise in numerous mechanical engineering systems and be responsible for developing the technology used in the plant. This type of highly skilled worker requires, as a baseline qualification, a comprehensive proficiency in their field gained through advanced degrees in a STEM discipline (*14*).

The following subsections provide an overview of each of the industry sectors and examples of specific jobs in the sectors that require highly skilled workers.

Advanced Technologies and Manufacturing

Advanced technologies and manufacturing is a technology-intensive, innovative version of traditional manufacturing, where employees utilize highly automated production processes. In

some cases, workers in this field can start earning occupational certifications for jobs while still in high school, but for the most part, on-the-job training is necessary in this field because of the fast pace of technical innovation. Jobs that may have required minimal training in the past are now powered by rapidly changing technological innovation. This requires the worker to continually update their knowledge through training and/or on the job experience (*15*).

Aerospace and Defense

The aerospace and defense industry focuses on research and development (R&D) of current and emerging technologies for use in commercial and military applications. Note that there is overlap with advanced technologies and manufacturing within this industry (e.g., aerospace manufacturing). As this industry works to develop some of the most advanced technologies in the world, in-demand workers within this industry require advanced degrees in STEM fields primarily focused on aerospace, mechanical, chemical, electronic, electrical and material engineering (*16*).

Information and Computer Technology

The information and computer technology industry is rooted in the design, operation, and implementation of computer science. Jobs in this field range from web developer or computer programmer to software or computer systems engineer. A unique aspect of highly skilled occupations within the information and computer technology industry is that some occupations require advanced degrees in STEM disciplines while others may only require hands-on experience. For example, a company looking to hire a software engineer will require the skillset capable of designing a programming language or framework (e.g., Ruby on Rails, JavaScript). Many major businesses within this industry recruit computer science majors directly from colleges and universities with this very skillset in mind. In contrast, the same company looking to hire a web developer may look for someone who, as opposed to formal education, has only has hands-on experience and proficiency with an existing programing language, such as basic html. In this case, both workers are considered highly skilled even though their background qualifications are vastly different (*17*).

Biotechnology and Life Sciences

The biotechnology and life sciences industry includes a wide range of fields from those in the medical research and development industry to those that study living organisms (*14*). Though currently there are few specialized degrees tailored to this industry, workers in this field are required to hold advanced degrees in a STEM field (*18, 19*). While the fields within these industries are unique and independent from one another, their grouping is based on the fact that they draw workers from a similarly skilled labor pool: individuals with highly specialized post-secondary degrees.

Energy – Traditional and Renewables

The U.S Energy and Employment report defines the energy industry in two categories: fossil fuels (traditional) and renewable and emission technology for energy efficiency (renewables). The traditional industry focuses on energy generation through three major sources: natural gas, coal, and oil. The growing renewables industry focuses on energy generation through solar, bioenergy, wind, nuclear and water sources (*20*). It is noteworthy that in response to the growing demand for highly skilled workers within the renewables industry, universities have begun expanding their curricula to provide specialized areas of study (e.g., energy studies) where students can receive an advanced post-secondary degree with knowledge about new technology in energy efficiency (*21*).

The energy field typically requires hands-on training regardless of formal education because employers prefer to tailor training to their specific sub-industry (e.g., natural gas, bioenergy, nuclear energy). Occupations in this industry can range from machinist to engineer, which are both highly skilled but require different forms of training. Education can range from a 2-year training program at a community college to a bachelor's degree from a 4-year institution in a STEM field. For example, an entry-level engineer would require an engineering bachelor's degree in addition to on-the-job training. However, a machinist may require a certificate from a 2-year training program where they would learn the hands-on skills necessary to obtain a job in the field (*20, 22, 23*).

Transportation Needs of a Highly Skilled Workforce

While transportation is a contributing factor in determining where skilled workers live and work, current research provides little information regarding the specific transportation preferences and needs of highly skilled workers, though some research exists regarding the connection between air travel and highly skilled workers.

Current research suggests that there is a relationship between metropolitan areas that have a high volume of air travelers and the number of high tech, scientific and technical jobs in that metropolitan area (*13*). In addition, air travel is an important part of how businesses meet the demand for short-term work in numerous locations throughout the country and world, as it is more cost effective to fly temporary highly skilled laborers to where the demand for their work exists, as opposed to training a new employee (*11*).

In addition, research suggests that metropolitan areas with major hubs for air transport are an important factor in the recruitment of a wide range of industries that rely on highly skilled workers. Frequent flights, more direct flights, and a wider range of interconnecting destinations are cited as favorable factors for highly skilled employees that travel frequently for business and leisure (*24*).

Interviews with Employers of Highly Skilled Workers

To further understand how transportation impacts the recruitment and retention of highly skilled workers in the state of Texas, researchers interviewed human resources and recruitment professionals to determine the transportation preferences of this highly sought after class of workers.

Interview Recruitment Methodology

Researchers began by identifying Fortune 500 companies within the state of Texas and categorizing them by industry. Researchers focused on companies in the five industries mentioned previously. Researchers identified companies to interview by conducting desktop research, referencing trade magazines and websites, and relying heavily on referrals by interviewees and other contacts within each industry. A final list of more than 100 companies was developed. Researchers relied on LinkedIn and company websites to identify individuals to interview. Once contacts from each company were identified, researchers used LinkedIn messenger, email, and direct phone calls to initiate contact and schedule interviews.

Summary of Interviewees

Researchers conducted 27 interviews. Table 1 provides a summary of the total number of interviews conducted with each industry, as well as a breakdown of the location of the companies interviewed by industry.

Table 1. Interviews by Industry and Location.

Industry	No. of Interviews	Austin	Dallas/Fort Worth	El Paso	Houston	San Antonio	Other
Advanced technologies and manufacturing	5	1		1	2		1
Aerospace and defense	5		3		1		1
Biotechnology, life sciences and renewable energy	5		2		2	1	
Energy (traditional and renewables)	5	1			4		
Information and computer technology	7	5			2		
Total	27	7	5	1	11	1	2

Interview Discussion Guide

Interviews were conducted in an informal manner, where the interviewee had a set of questions, but the conversations with interviewees often expanded beyond the discussion guide. However, the discussion guide provided a roadmap for the interviewer to ensure consistency among all interviews conducted. The discussion guide was composed of the following questions:

1. When you are interviewing a candidate for a position that you consider highly skilled and difficult to recruit for, has the candidate asked questions about:
    - Congestion? (Are there specifics other than "traffic is really bad"? Do they say things like "I don't want to live more than 15, 30, 45, etc. minutes from work?")
    - Parking? (Is there ample parking close to the office? Is it free? If not, how much is it?)
    - Transit to your office (Transit availability in other parts of town? Transit availability on weekends, nights, etc. How reliable is it? Can I get around without a car?)
    - Walkability? (Is the city walkable? Do people walk to work? Are there shops and amenities that people can walk to from the office?)
    - Proximity to airport?
2. In recruiting discussions, what quality of life factors do candidates ask about?
3. Do transportation options and housing choices play into their decisions?
4. Do candidates from different parts of the country express concerns regarding transportation when considering working in Texas? What about if moving within Texas?
5. What aspects of the transportation system in Texas make the state competitive in recruiting desirable candidates?
6. Conversely, what aspects of the transportation system in Texas make the state noncompetitive in recruiting desirable candidates?
7. What kind of transportation incentives does your company offer? (e.g., transit pass, parking reimbursement, guaranteed parking for employees, Car2Go, ridesharing, car/vanpools.)
8. Is there anything that you think the State of Texas needs to do specific to transportation that you think would make it easier to recruit and retain highly skilled workers?

Summary of Interview Findings

The following subsections provide the findings of the interviews. Note that interviewers (researchers) asked interviewees (recruiters) to provide answers based on their experience working with and recruiting highly skilled workers (candidates).

Congestion

Traffic congestion was a topic that was consistently brought up by recruiting professionals, who explained that potential candidates would ask about the amount of traffic that they would likely have to sit in if accepting a position. Recruiters implied that congestion was an important factor

to highly skilled candidates in considering a job offer. If a candidate was considering relocating, recruiters would suggest moving to certain parts of the city that would make the commute easier. However, if a candidate currently lived in the same city where the new job was, the location could be a more compelling factor in whether or not the candidate would consider the job. For example, interviewees from companies in Austin, Houston, and Dallas all explained that if they were located on one side of the city, and a candidate lived on the opposite side of the city, it would be extremely difficult to persuade the candidate to seriously consider a position with that company.

It is also notable that a few interviewees who discussed the challenges of recruiting to cities with significant congestion also made the point that the highly skilled and highly sought-after positions that they recruit for were also very well compensated. Interviewees felt as though this reduced the significance of the role that congestion plays in a candidate's interest in accepting a position because if they were truly interested in the position, they could "buy their way out of a commute," as they could afford the ability to choose to live near where they work. This was primarily true of interviewees from companies located centrally in Austin and Houston, where home prices are significantly more expensive in the central parts of these cities.

Many of the interviewees also explained that the input they receive from candidates indicates that highly skilled employees (prospective and existing) are less concerned with how long they have to spend travelling to work every day than they are concerned with sitting in congestion. For example, one recruiter explained that the skilled employees being recruited felt that 20 minutes sitting in congestion is less preferable than 40 minutes spent commuting in free-flow traffic conditions.

Parking

Parking was rarely an issue for a recruiter's ability to attract and retain highly skilled workers, according to the interviewees. The majority of the interviewees indicated that their offices provide ample parking and also indicated that when they were recruiting highly skilled workers, this question didn't come up often from candidates, as there is an assumption that parking will be provided. The exception to this finding was for companies located in central city settings. In the rare cases of companies located within the downtowns of major cities that did not provide actual parking spaces (e.g., adjoining parking garage), alternatives such as parking or transit stipends were offered. In two cases, interviewees indicated that their company had been located downtown but for a number of reasons, including the high cost of employee parking (in some cases this was employer's cost, and in some cases this was a cost to the employee), decided to relocate outside of the city's core.

Transit

Interviewees indicated that when talking to highly skilled candidates from outside of Texas, it was more common for candidates to ask about public transportation. This was especially true of candidates who were living in major metropolitan areas that have established public transportation systems like New York, San Francisco, and Chicago. Interviewees indicated that

attracting these candidates to Texas was more challenging as they were more likely to prefer not owning a vehicle. However, none of the interviewees indicated that they were aware of a case where this preference caused a candidate not to take a job in Texas. In addition, interviewees indicated that these examples did not represent the majority of the conversations that they had with highly skilled candidates, especially for candidates that were located within Texas.

When asked whether their current highly skilled workforce used public transportation, the majority of interviewees indicated that public transit in their office's location was not convenient and that the vast majority of their workforce (highly skilled or otherwise) drove vehicles. In addition, interviewees indicated that many of the highly skilled employees (prospective and current) could afford to own a personal vehicle and that, in some cases, it was the lower paid, un-skilled workers that relied on alternative modes of transportation.

Interviewees recruiting for central city locations were far more likely to indicate that a public transit option was important in recruiting and retaining highly skilled workers, but the majority of the interviewees were not located in downtown settings.

Walkability

Walkability was not a topic that recruiters indicated was a significant part of their conversations with highly skilled candidates. Interviewees indicated that candidates did occasionally ask if they could walk to work (as opposed to other modes), but this was not an expectation or deal-breaker. Interviewees did indicate that it was more common for highly skilled candidates to ask about nearby amenities (e.g., restaurants, entertainment) for lunch or after work activities–but the majority of interviewees indicated that the candidates recognized that they would have to access these locations by car, as opposed to having the opportunity to walk.

A handful of interviewees indicated that they have responded to highly skilled employee's desire for nearby services by building campuses with amenities, such as restaurants, gyms, and dry cleaners on-site. Interviewees indicated that while these campuses are built to meet a range of employer needs, including these amenities is a way to meet employees' desires to have services and attractions nearby.

Some interviewees did indicate that they think that having more amenities near their offices in a walkable environment would be a good recruiting tool, or something they could use to more effectively promote the location of their office.

Airports

Access to airports was not an important factor to the vast majority of interviewees. The one exception is within the energy sector, where some highly skilled workers tend to be temporarily located in rural areas and need to travel long distances to access airports. This however, is not a preference that would help retain or recruit those highly skilled workers, as their jobs generally require them to be located often (at least for the duration of a given project) in remote areas where access to all amenities, including airports, is a challenge.

Transportation, Housing Choices, and Quality of Life

When asked about how transportation impacts quality of life, the majority of interviewees indicated that congestion was an aspect of the transportation system in Texas that hurts quality of life. Interviewees noted that while some highly skilled employees chose to (if they could afford to) live nearer to where their office was located, this was not the only, or even the most important factor influencing a highly skilled worker's choice of housing location. Issues such as school districts and lifestyle preference (suburban vs. urban vs. rural) were also mentioned as being important factors.

Factors that make Texas Competitive in Recruiting and Retaining Highly Skilled Workers

Some interviewees indicated that the highway system in Texas provides a competitive advantage for recruiting highly skilled workers, as the roadway networks in Texas cities provide ample options for travelling throughout each region. Interviewees indicated that this advantage is tempered due to the congestion that exists on many of these roadways.

In addition, interviewees noted that access to toll roads, high-occupancy vehicle lanes (HOV), and park and rides were also aspects of the transportation system in Texas that are viewed favorably by recruiters.

Finally, interviewees indicated that Texas cities, especially the major metros, all have access to airports that provide ample connections to both other cities within Texas and locations throughout the United States and internationally.

Factors that make Texas Non-Competitive in Recruiting and Retaining Highly Skilled Workers

Interviewees indicated that congestion is a factor that hinders their ability to recruit highly skilled candidates. One interviewee mentioned that 15 years ago, when recruiting out of state (especially from Silicon Valley and New York City) low congestion levels were a competitive advantage in recruiting for Texas, as congestion in Texas (especially in Central Texas) was not nearly as bad as in other parts of the country. According to the interviewee, those days are long gone, as the congestion here is no better (or no worse) than in other locations. Interviewees also indicated that road construction seems to take longer in Texas, which could add to the congestion issues.

Interviewees did indicate that low levels of convenient public transportation, bikeability, and walkability make it hard to recruit from locations in the United States that are densely populated and have robust transit systems. Specifically, interviewees indicated that recruiting from New York City and San Francisco can be difficult if the prospective employee is used to being able to take transit, bike, or walk regularly as opposed to driving a car.

Transportation Incentives

The vast majority of interviewees indicated that their employees (highly skilled and otherwise) have flexible schedules. This includes the ability for employees to either arrive earlier or later in

the work day as well as introducing the 9/80 bi-weekly work schedule (a two workweek schedule of eight 9-hour days, one 8-hour day, and one day off). In addition, most interviewees indicated that they offered work-from-home opportunities as well. Interviewees indicated that flexible schedules and the ability to work from home are recruiting tools used to attract highly skilled workers. This is not true across the board, as some highly skilled job duties are not conducive to working remotely or having a flexible schedule. But when possible, interviewees indicated that these incentives were typically used to combat concerns with congestion when recruiting highly skilled candidates.

Another incentive that was offered to some of the companies who are located outside of the core include company-supported carpooling or company-provided vanpools. In one case for a company that is located outside of the Houston core, an interviewee indicated that 30 percent of the workforce in a division that employs primarily highly skilled workers use a vanpool program. The vanpool programs for this company also accommodate employee's flexible schedules as well.

The "Magic Wand" Question

Researchers asked interviewees their opinion about what, if anything, the State of Texas needs to do regarding transportation to make it easier to recruit and retain highly skilled workers. Researchers posed this as the "magic wand" question, where if an interviewee had a magic wand, what would they change? Interviewees indicated that since congestion was the most significant issue, the government should work with companies to promote policies and programs that reduce the number of cars on the road during rush hours. In addition, almost every interviewee indicated that implementing more mass transit would be helpful in their ability to recruit highly skilled candidates. This included citywide rail as well as inter-city rail.

Industry Specific Findings

Researchers noted that while there were similar findings among interviewees from all industries, some trends were specific to certain industries.

Aerospace and Defense

Interviewees from aerospace and defense companies indicated that regardless of where they were located, the general sentiment was that transportation did not impact their ability to recruit highly skilled candidates.

Energy

Energy companies, especially oil and gas companies, did not seem overly concerned with offering employees options that would reduce the burden of commuting, such as schedule flexibility or work from home options.

Information and Computer Technology

Companies in this industry were by far the most interested in providing high quality of life and workplace culture for their employees based on the national competitiveness of this industry and their highly skilled candidates. These companies were the most consistent in offering flexible schedules and work-from-home opportunities. In addition, this industry was far more interested in providing their employees with alternative transportation options like company-subsidized transit passes, a bikeable work environment that includes bike lockers and showers, etc.

Biotechnology and Life Sciences

Companies in this industry had a similar approach and attitude towards recruiting highly skilled workers as the information and computer technology industry. As individuals within this field are often highly educated and highly sought after, recruiters acknowledged that providing high quality of life is a significant factor in their ability to attract the highly skilled candidates they need.

Advanced Technologies and Manufacturing

For the most part, interviewees indicated that they trained their highly skilled workers on the job, so while this industry relies on highly skilled workers, it is less common for this industry to rely on recruitment of highly skilled candidates to meet this need.

Key Findings

For Industries Where Recruiting Highly Skilled Workers Is More Competitive, Transportation Is More Important

Interviewees from the biotechnology/life sciences and the information/computer technology industries indicated that recruiting highly skilled talent within their fields is extremely competitive. Therefore, these industries focus on recruiting strategies that provide the highest quality of life for potential employees in order to compete for these highly sought after employees. Interviewees from these industries indicated that transportation was a factor that impacts quality of life, and to that end, transportation plays a role in their ability to recruit and retain highly skilled workers. For the most part, interviewees from the advanced technologies and manufacturing, aerospace and defense, and energy industries indicated that transportation was not a topic that came up often when recruiting highly skilled workers. Some interviewees indicated that their ability to recruit highly skilled candidates was not as difficult as the biotech/life sciences and tech industries, so quality of life considerations were not as significant a part of their recruiting strategies. Some interviewees indicated that their highly skilled workers were often "trained up from the floor," so the impact of transportation on their need to recruit highly skilled candidates was less of a factor in their ability to meet their company's employment needs.

Transportation Impacts Quality of Life for Highly Skilled Candidates, but It Is Not Currently a Deal-Breaker

Interviewees from the biotech/life sciences and tech industries who indicated that transportation and its impact on quality of life was a factor in their recruiting strategies provided a range of information about how transportation plays a part in how they position their companies to attract highly skilled candidates. Interviewees indicated that a range of factors such as workplace culture, job location (both the city and location within the city), and job place amenities contribute to quality of life. And while interviewees indicated that transportation is a significant contributor to a candidate's potential quality of life, it is only one piece of the puzzle. Additionally, no interviewees indicated that any aspect of transportation in Texas created a "deal breaker" scenario for a highly skilled candidate that they were trying to recruit.

Recruiters Are Aware of Transportation Challenges in Texas, and This Could Lead to Challenges for Recruiters of Highly Skilled Workers in the Future if Transportation Continues to Worsen in Texas

It is worth noting that, interviewers did notice that almost all interviewees, regardless of how significant they deemed transportation in their ability to recruit highly skilled workers, were aware that congestion was a challenge in the state of Texas. Interviewees from industries that did not think transportation impacted their recruiting ability at all still provided input about perceived transportation shortcomings in Texas, and how it might impact their recruitment approaches. For example, one interviewee in the aerospace and defense industry indicated that if a candidate lives on the other side of the city from where they are located, they know they will not be successful in recruiting them.

The distinction between what researchers heard from interviewees in the industries who downplayed the importance of transportation in their ability to recruit highly skilled workers was the relative ease with which those industries can identify and hire those skilled workers. When speaking to interviewees from the biotech/life science and tech industries, recruiters were even more aware of how transportation impacts their ability to recruit. While it may not keep someone from taking a job, it was clear that these individuals had spent considerable time thinking about how to discuss the transportation issues in Texas with highly skilled candidates. For example, it was common for interviewees in these industries to talk with highly skilled candidates about commuting options, best commute times, best places in the city to live if they were moving from out of town and schedule flexibility to avoid peak travel times. So even though, according to interviewees, transportation alone was not keeping these highly skilled candidates from accepting jobs in Texas, interviewees indicated that they made sure to explain that congestion is a challenge in Texas and discussed a range of strategies to limit the impact of congestion on candidates' quality of life. So while transportation is not a deal breaker for highly skilled candidates now, recruiters are clearly aware of the impact it currently has on the quality of life for their prospective employees; and if the transportation challenges in Texas continue to worsen

(e.g., congestion, lack of options), it may lead to greater challenges for Texas companies' ability to recruit and retain highly skilled workers.

Recruiters View Transit as a Potential Recruiting Tool, Though They Gave No Indication That Highly Skilled Workers Prefer This Mode of Transportation

When asked what the State of Texas needs to do about transportation to make it easier to recruit and retain highly skilled workers, the majority of interviewees indicated that improved or expanded high-capacity public transportation (primarily intra and inter-city rail) would make it easier to recruit highly skilled workers. When asked why this was, most interviewees indicated that this type of transit could be used as a recruiting tool (especially if the company had direct access to it). However, when asked if they thought that highly skilled workers would prefer to use this type of transportation over other modes, interviewees indicated that they had no reason to believe that; and moreover, some recruiters indicated that because highly skilled workers are often highly compensated, they would be less likely to need to use an alternative mode of transportation, as they are more likely to afford their own vehicle. Moreover, one interviewee explained that the low-skilled workers that they employ would be the most likely segment of their workforce to utilize high-capacity transit, as they are often in one-car households and lack transportation options.

When Possible, Flexible Schedules and Telecommute Opportunities Are Standard Recruiting Tools for Highly Skilled Workers

Most interviewees indicated that they offer highly skilled workers the ability to have flexible schedules and telecommute options as a recruiting tool. This was especially true in the information and computer technology industry. While interviewees explained that some positions are not conducive to working remotely or having a flexible schedule, most interviewees indicated that this was something that was increasingly expected from highly skilled workers. In addition, interviewees in major metros acknowledged that these incentives were directly aimed at providing highly skilled workers the ability to avoid long commutes.

Access to Major Hubs for Air Travel Is an Important Aspect of Recruiting Highly Skilled Workers

As discussed in the literature review, research suggests that access to airports is an important aspect of recruiting highly skilled workers. While interviewees did not indicate that this was an aspect of the transportation system that impacted their ability to recruit highly skilled workers, researchers noted that all of the companies interviewed were located in metropolitan areas that had access to major hubs for air transport. The fact that interviewees dismissed the importance of access to air travel, while researchers found that literature cited its importance, indicated that interviewees may take for granted the benefit they receive from being located in a metropolitan

area with access to major hubs for air travel. This speaks to an aspect of the transportation system that provides Texas with a competitive advantage when attracting highly skilled workers.

How Transportation Policy Can Impact the Growth of Texas' Highly Skilled Workforce

While interviewees indicated a range of opinions regarding the significance of the role that transportation plays in attracting and retaining highly skilled workers in Texas, all companies provided at least some example of how transportation affects recruiting this segment of the workforce. As the demand for highly skilled workers increases both nationally and globally, policy makers may benefit from continuing to monitor how the transportation preferences and needs of this segment of the workforce change. While Texas is currently faring well in its ability to attract highly skilled workers, aspects such as congestion could hinder the state's strong position in the future. Monitoring how congestion impacts the state's competitiveness, and aggressively pursuing strategies that counteract congestion will ensure the state's ability to continue to attract this segment of the workforce, which is tantamount to the future economic health of the State of Texas.

References

1. Simek, C., Miller, M., and A. Rutter. Role of the Transportation System in Attracting and Retaining Business. PRC 16-61 F. Texas A&M Transportation Institute, May 2017.

2. Group, T. W. The World Health Organization quality of life assessment (WHOQOL): Development and general psychometric properties. *Social Science & Medicine*, Vol. 46, No. 12, 1998, pp. 1569–1585.

3. Shafer, C., B. K. Lee, and S. Turner. A tale of three greenway trails: user perceptions related to quality of life. *Landscape and Urban Planning*, Vol. 49, No. 3-4, 2000, pp. 163–178.

4. Sarmiento, O. L., T. L. Schmid, D. C. Parra, A. Díaz-Del-Castillo, L. F. Gómez, M. Pratt, E. Jacoby, J. D. Pinzón, and J. Duperly. Quality of Life, Physical Activity, and Built Environment Characteristics among Colombian Adults. *Journal of Physical Activity and Health*, Vol. 7, No. 2, 2010.

5. Fuller, J. B. Whose Responsibility Is it to Erase America's Shortage of Skilled Workers? https://www.theatlantic.com/business/archive/2015/09/whos-responsible-for-erasing-americas-shortage-of-skilled-workers/406474/. Accessed May 4, 2017.

6. Survey shows growing US shortage of skilled labor. http://www.cnbc.com/2015/07/20/survey-shows-growing-us-shortage-of-skilled-labor.html. Accessed May 3, 2017.

7. Majcher, K. The Hunt for Qualified Workers. *MIT Technology Review*, Vol. 117, No. 6, 2013, pp. 68–69.

8. Zarbock, R. Workforce development in Manufacturing. *The Enterprise*, 2013.

9. Rothwell, J. Defining Skilled Technical Work. *Issues in Science & Technology*, 2016, pp. 47–52.

10. Mahroum, Sami. Highly skilled globetrotters: mapping the international migration of human capital. *R&D Management*, Vol. 30, No.1,2000, pp. 23-32.

11. Salt, J. International Movements of the Highly Skilled. *OECD Social, Employment and Migration Working Papers*, No. 3, OECD Publishing, Paris. 1997. http://dx.doi.org/10.1787/104411065061. Accessed Jan. 19, 2017.

12. Majcher, K. The Hunt for Qualified Workers. *MIT Technology Review*, Vol. 117, No. 6, 2013, pp. 68–69.

13. Alkaabi, K. A., and K. G. Debbage. Air passenger demand and skilled labor markets by US metropolitan area. *Journal of Air Transport Management*, Vol. 13, No. 3, 2007, pp. 121–130.

14. Stewart, M. Transforming Higher Educations: A Practical Plan for Integrating Sustainability Education into the Student Experience. *Journal of Sustainability Education*, Vol. 1, May 2010, p. 13.

15. Song, J., M. Salazar, M. Batch, C. Nichols, and F. Zaragoza. A New Educational Paradigm to Train Skilled Workers with Real World Practice. *ASEE Annual Conference and Exposition: 360 Degrees of Engineering Education*, 2014, pp. 1–11.

16. Garmise, S. *An Assessment of Education and Training Needs in the Ohio Aerospace Industry*. Maxine Goodman Levin College of Urban Affairs, Cleveland State University, 2006.

17. Turner, K. Why students are throwing tons of money at a program that won't give them a college degree. https://www.washingtonpost.com/news/the-switch/wp/2016/03/17/why-students-are-throwing-tons-of-money-at-a-program-that-wont-give-them-a-college-degree/?utm_term=.a300e3bbddb3. Accessed Jan. 19, 2017.

18. Davis, D. Finding the Green Workforce. *Power Engineering*, Vol. 28, No. 2, 2011, pp. 6–8.

19. Philippidis, A. Top 10 Biotech Jobs Most in Demand over the Next Decade In Which Occupations Are Employers Most Likely to Create Jobs in the Years Ahead? http://www.genengnews.com/in sight-and-intelligence/top-10-biotech-jobs-most-in-demand-over-the-next-decade/77900672. Accessed Jan. 30, 2017.

20. U.S. Energy and Employment Report. U.S. Department of Energy, 2017.

21. Jennings, P. New directions in renewable energy education. *Renewable Energy*, Vol. 34, No. 2, 2009, pp. 435–439.

22. Ruehlicke, L. The Most In-Demand Occupations In The Petroleum Industry For College And University Grads. http://talentegg.ca/incubator/2012/10/10/indemand-occupations-petroleum-industry/. Accessed May 8, 2017.

23. Webster, M. J. Where the jobs are: The new blue collar. https://www.usatoday.com/story/news/nation/2014/09/30/job-economy-middle-skill-growth-wage-blue-collar/14797413/. Accessed May 8, 2017.

24. Button, K., S. Lall, R. Stough, and M. Trice. High-technology employment and hub airports. *Journal of Air Transport Management*, Vol. 5, No. 1, 1999, pp. 53–59.