



Identification of Workforce Skills Sought in Transportation Industry: What do job ads look for?



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Introduction

The transportation industry:

→ **16 million workers** across **75 job titles**

→ Undergoing rapid **transformation driven by emerging technologies** like Autonomous Vehicles, Machine Learning, and Artificial Intelligence.

→ Transformation is one of the five focus points in **USDOT's 2022-2026 Strategic Plan** along with *safety, equity, climate and sustainability, and economic growth*

→ Transportation agencies face challenges recruiting skilled talent in tech-driven fields like AI, competing with startups and tech firms

Research Objective:

To uncover the workforce skills that transportation industry employers seek and to compare the sought-after skills with the skillset necessary for the transformation

Approach

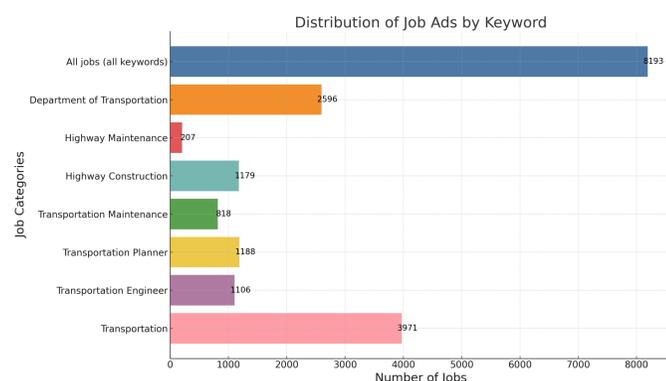
- Job ads from platforms like **Indeed, LinkedIn** and **DOTs websites** were examined to the alignment of job requirements with workforce skills.
- **8,193** job ads (collected between December 2023 and June 2024) were analyzed
- Job descriptions are analyzed for **“hard”** and **“soft”** skills.
- Job salary ranges were analyzed for insights into industry trends.
- The sought-after skills were compared with O*NET database that documents the workforce skill expectations of the transportation industry professionals.
- Emerging roles, as outlined in the Transportation Systems Management and Operations (TSMO) Workforce Guidebook, were analyzed and used as a proxy for emerging job titles in the transportation sector

Methodology

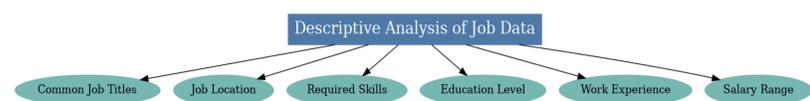
The methodology can be divided into two main categories:

1) Data collection

- Web scraping tool Octoparse on popular job search websites were used: Indeed, LinkedIn and DOTs websites.
- Different keywords in Figure 1 were searched in combination or individually.



2) Data analysis



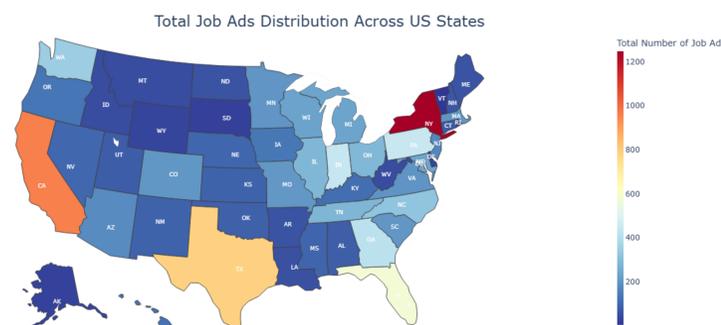
→ Text mining Job Qualifications and Skills using ChatGPT 3.5:

1. Hard skills (Experience with certain tools or software packages)
2. Soft skills (Teamwork, problem solving etc.)

Data Characteristics

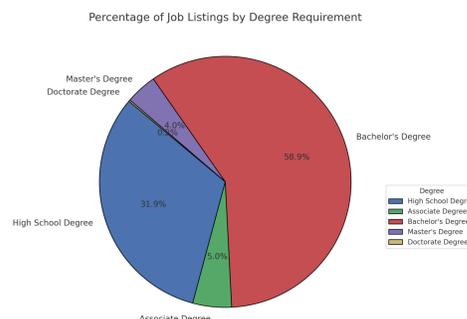
Job Location

- Higher number of jobs in states like California, Texas and New York, aligning with the overall number of job opportunities in all industry sectors
- Not all DOTs advertise in job search platforms, but at State DOT websites.



Education Level

- About 40% of the job ads do not explicitly indicate any education requirement.
- The job ads that do not require a degree typically fall into categories where practical skills, certifications, and hands-on experience are more critical than formal education.
- High demand for middle-skill jobs – a finding that aligns with literature



Work Experience

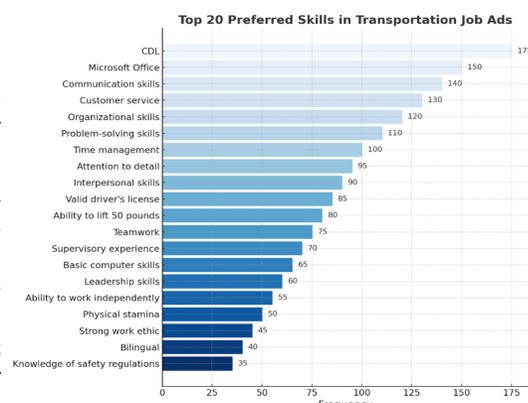
- About 71 percent the job ads mention work experience in their description.
- The most frequent years of experience are between the range of 1 to 5.

Salary Range

- Salary information is available for 4,679 job advertisements (57% of the total)
- Non-DOT jobs (70,000) offer higher median annual salary than DOT jobs (66,000).
- West region (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming) offers the highest median annual salaries across the regions.
- Holding a PE certificate (84,000) or a greencard (88,000) lead to higher salaries.

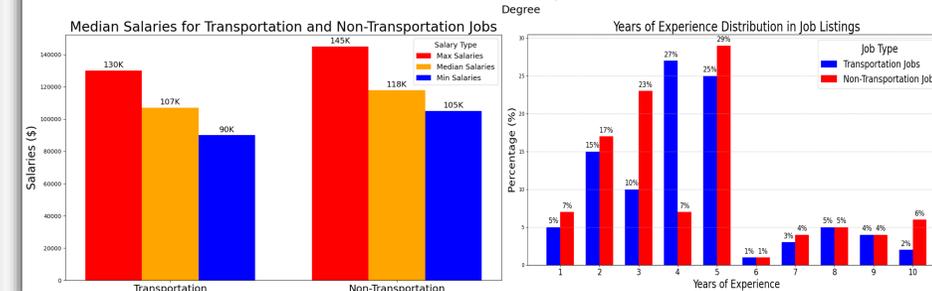
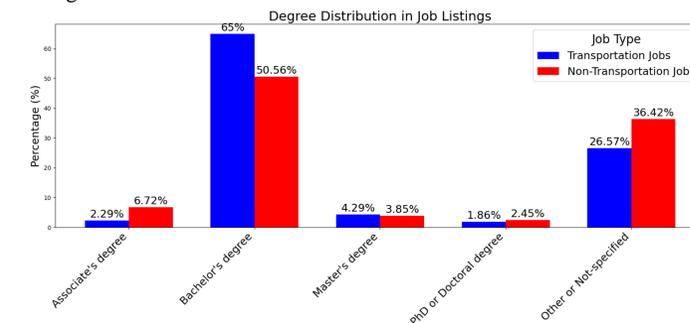
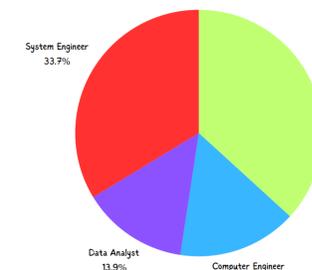
Required Skills

- Commercial Drivers license (CDL) is the most repeated skill in job ads.
- Specificity for both hard/technical and soft skills are crucial for efficient recruitment.
- Hard skills like operating a vehicle or using a software can be measured and tested
- Soft skills such as teamwork are more context-dependent.
- Ambiguity about how the soft skills are valued/assessed under different companies/jobs.



Transportation Jobs of the Future: Are they here yet?

- The 19 emerging job titles as listed in TSMO Workforce Guidebook were searched in the Indeed website as a proxy of emerging job titles in transportation.
- Total of 2,870 jobs were extracted and nearly 30% were related to transportation sector.
- Transportation vs. non-transportation salary offers: \$107,000 vs. \$118,000
- Non-competitive salary offers in transportation industry.
- Yet, higher percentage of transportation jobs require bachelor's and master's degree. (70% vs. 54%)
- Emerging job roles like Transportation Data Ethicist, Connected and Automated Vehicle Specialist, AI Scientist, and Traffic Incident Program Manager were absent from the dataset.



Conclusion

- Job ads in transportation sector emphasize a mix of technical (e.g., Python, GIS, SQL) and soft skills (e.g., communication, teamwork), though soft skills lack sufficient specificity.
- Middle-skill roles, requiring postsecondary training but not necessarily a college degree, dominate the workforce, underscoring importance of targeted recruitment and training.
- Salaries for emerging roles in transportation are often non-competitive compared to other industries, limiting the sector's ability to attract top talent.
- Literature indicates 50% of state transportation agencies depend significantly on consultants for key technical positions. Failure to hire qualified candidates will lead to lack of in-house expertise that is necessary for transformation.
- Jobs like AI Scientist, CAV Program Manager, and Transportation Data Ethicist are not advertised, signaling a lack of hiring emphasis on emerging job titles.

Recommendations

- Enhancing job ad specificity and broadening recruitment channels can improve the quality of the candidate pool
- Developing in-house expertise for emerging positions, such as ITS and systems engineering, is critical to reducing reliance on consultants.
- Competitive salary structures for emerging job titles is essential to support the transportation sector's evolving technological and operational needs.