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Supply Chain Student Biases Regarding Transportation Jobs

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“Supply Chain Student Biases Regarding Transportation Jobs”

By:

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Introduction:

As a Supply Chain student at the University of Arkansas, I have made some observations about how students view jobs with a transportation focus. I have seen other students gravitate towards jobs on the consumer-side of the supply chain job market, with many joining large companies like Walmart and Amazon. The university itself has helped instill this feeling in me as well, due to their focus more on the consumer-side of supply chains. There have only been two classes offered to me thus far in my degree plan that I felt truly addressed transportation-side supply chains at all, with them focusing far more on simply teaching us what each mode of transportation is good at and making sure we understand the proper value of modern strategies like intermodal.

An important question to answer before going any further is how I would define a transportation-side supply chain job. When I state this term, I am referring to jobs that focus entirely on moving products from one location to another for a customer. This can be by any mode of transport like rail, road, water, air, or pipeline. This also would include jobs such as ones at J.B. Hunt, BNSF, Transplace, ArcBest, and any other company that fits the criteria. I am also referring to the roles that only someone with a college degree in Supply Chain Management would be expected to fill within these companies.

On the other hand, when I talk about consumer-side Supply Chain I am referring to companies that would have you more focused on serving the needs of retail consumers. This includes jobs like being a vendor that interfaces with a retail chain and making sure that your product category stays stocked as much as possible. These jobs have a narrow focus on a few product categories and are much less focused on how the product will get to the distribution center than someone who works at a transportation company that is purely focused on moving products for the customer.

This seeming bias towards consumer-facing supply chain roles has even been noticed by my thesis advisor, someone who has previously taught the class SCMT 3443 which focused entirely on learning the different forms of transportation and what they each held as a competitive advantage over each other. This anecdotal evidence was the main inspiration for trying to find if students truly held any specific biases when it came to different modes of transport, what a transportation job might expect of them, or where they might have to live for a transportation job. The first way we tried to gain some answers on how many students were taking transportation jobs was by asking the Career Center here at the University of Arkansas how many students were taking these positions. Unfortunately, they declined to comment on how many students were taking the different job types, leading to the creation of a survey to learn from students themselves what specific feelings they had.

Literature Review:

According to the paper by Leon and Uddin (2016), how students decide what major they take and what job they want is highly effected by several factors. It has been shown that what major students take are largely based off them being interested in the general field and whether they have lived abroad. The career field that students choose is influenced by race, whether they have lived abroad, and by their prior experiences. This early creation of student interests means that supply chain companies looking for the best talent should be reaching out to students before they enter college. While the study had limited geographic coverage it still nonetheless showed that if transportation companies are struggling to find good talent in the Supply Chain Management job market, then they should aim to work with younger students.

Survey Questions:

The survey questions were carefully chosen to help us both capture data on student biases against certain industries and environments, while also having information to remove students that did not fit the population we were trying to survey. Questions one through four were designed to allow us to separate those that could potentially harm my data set's validity. The original idea for these questions was to remove anyone that we did not feel would be knowledgeable enough to have an educated sentiment on transportation jobs. That is why we wanted to exclude those that were underclassmen, non-supply chain majors, and those that had not taken SCMT 3443, which is the course that discusses all the different modes of transport and their use. Of these questions, only one ended up being required to remove outliers from the data set and that was question one. Question one, caused only two respondents to be removed from the data set and the reason for their dismissal was the fact they were not Supply Chain majors. The reason we do not want any non-Supply Chain majors in the data set is the fact that they are most likely not as well versed in Supply Chain topics to give us well informed responses. Question two was not used to remove any students, but instead was used to test whether males or females had any difference in viewpoint when it came to transportation jobs.

Questions five through nine are quite simple in nature, as they are designed to find any biases students may have for a certain transportation method over another. These transportation methods are covered in SCMT 3443, and as such are well understood by the students taking the survey. Questions ten through thirteen seek to understand if students feel that transportation jobs should not require a supply chain management degree. This sentiment could potentially come from students feeling that transportation jobs are not necessarily the white-collar work that they would expect of someone with a degree. The current college generation is the most highly environmentally conscious one to date, and because of this, I created question fourteen to see if they might be turned away from transportation jobs due to a perceived environmental dirtiness. Questions fifteen through twenty-two were chosen because they could give us some insight into students' thoughts pertaining to a typical transportation job, as these are all potential possibilities when it comes to transportation jobs. Question 21 can be largely ignored in the context of trying to find biases with students as it was more of an exploratory question to

see how many students had been potentially affected by the ongoing pandemic when it came to them finding internships. The last three questions seek to find any affinity, or aversion students may have to certain sized cities they may be required to work in as a part of a supply chain management transportation job.

Analysis:

The survey questions give us a type of data called "Likert Data." This data type is non-numeric and cannot be handled by inferential statistical analysis like a t-test. To allow for us to test the data, the different text values have been converted to number equivalents where Strongly Agree equals 2, Agree equals 1, Neutral equals 0, Disagree equals -1, and Strongly Agree equals -2. This numbering system was not arbitrarily chosen as a non-biased data set should follow a standard distribution, a feat that in this numbering system would produce a perfect mean value of 0. This allows for the testing of any bias in the data set away from 0 by using it as the null hypothesis we test against. The Yes or No questions were handled similarly as they were given values of -1 for No and 1 for Yes and tested against a null hypothesis of 0. The standard value of alpha for showing that a term is statistically significant is 0.05 and that is the value I will be using in this research to conclude if my data has any level of statistically significant bias.

Unfortunately, there is a problem with my data set as it did not receive as many responses as was initially desired. The target was to have 25 male and 25 female students of the proper characteristics take the survey. We not only met this goal for male students but exceeded it. Sadly, that same cannot be said for female students as we only achieved 17 with the proper characteristics to be included in the analysis of the data. This occurred despite contacting multiple professors and Supply Chain Management organizations at the University of Arkansas including Women Impacting Supply Chain Excellence and the Arkansas Supply Chain Association.

In the analysis of both styles of question the test used was the two-sample t-test with a classification variable of gender. This test was used because it felt important to find if there was any difference in the variance for men or women when it came to analyzing the outcomes. Especially considering the sample of women was smaller than that of men it seemed extra important to capture any irregularities between the two. To accomplish the testing of the data the software SAS Enterprise Guide was used. The usage of this statistical analysis software was arbitrary, as it does the same analysis as any other software would, but I am most familiar with it. Below you can find the outputs from the most interesting t-tests as given by SAS Enterprise Guide. Note that what I refer to as the p-value for statistical significance is labeled as Pr>|t| by SAS, while the p-value for equal variances is labeled as Pr > F by SAS. Depending on whether we reject or fail to reject the null hypothesis for equal variances determines if we use the Pooled or Satterthwaite method when we compare p-values for statistical significance. Using this test it can be shown that all of the multiple choice questions failed to have any questions show a

statistically significant bias, while the Yes/No questions yielded a single result that was statistically significant.

Variable: Q7

Q2	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
Female		17	1.2353	0.7524	0.1825	-1.0000	2.0000
Male		28	1.1429	0.9705	0.1834	-1.0000	2.0000
Diff (1-2)	Pooled		0.0924	0.8956	0.2754		
Diff (1-2)	Satterthwaite		0.0924		0.2587		

Q2	Method	Mean	95% CL Mean		Std Dev	95% UMPU CL Std Dev	
Female		1.2353	0.8484	1.6222	0.7524	0.5499	1.1182
Male		1.1429	0.7666	1.5192	0.9705	0.7586	1.3030
Diff (1-2)	Pooled	0.0924	-0.4629	0.6478	0.8956	0.7346	1.1252
Diff (1-2)	Satterthwaite	0.0924	-0.4304	0.6152			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	43	0.34	0.7387
Satterthwaite	Unequal	40.287	0.36	0.7228

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	27	16	1.66	0.2893

Question 7 is where students were asked if they would take a job with a transportation company that was primarily working with air-based transportation. This test did fail to be statistically significant, but it did also have a very positive mean with a value over 1. This implies that some students have a very positive view of airlines, but not enough for a majority. Being the highest mean of any mode of transportation seems to indicate that any companies with a large airline presence should be using it as a marketing point to draw in Supply Chain majors. The lack of statistical significance though means that it cannot be conclusively shown though that students do in fact favor them above any other mode of transportation.

Variable: Q10

Q2	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
Female		17	-0.8235	0.8828	0.2141	-2.0000	1.0000
Male		28	-0.8571	0.8483	0.1603	-2.0000	1.0000
Diff (1-2)	Pooled		0.0336	0.8613	0.2648		
Diff (1-2)	Satterthwaite		0.0336		0.2675		

Q2	Method	Mean	95% CL Mean		Std Dev	95% UMPU CL Std Dev	
Female		-0.8235	-1.2774	-0.3696	0.8828	0.6452	1.3119
Male		-0.8571	-1.1861	-0.5282	0.8483	0.6631	1.1390
Diff (1-2)	Pooled	0.0336	-0.5005	0.5677	0.8613	0.7065	1.0822
Diff (1-2)	Satterthwaite	0.0336	-0.5107	0.5779			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	43	0.13	0.8996
Satterthwaite	Unequal	32.848	0.13	0.9008

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	16	27	1.08	0.8292

Question 10 had a largely negative mean, which is an understandable sentiment given that they clearly believe that supply chain jobs should require a college degree, or they most likely would not be in this major. Sadly this sentiment cannot be conclusively shown as the test failed to be statistically significant.

Variable: Q14

Q2	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
Female		17	-0.8824	0.7812	0.1895	-2.0000	1.0000
Male		28	-1.2500	0.6455	0.1220	-2.0000	0
Diff (1-2)	Pooled		0.3676	0.6991	0.2149		
Diff (1-2)	Satterthwaite		0.3676		0.2253		

Q2	Method	Mean	95% CL Mean		Std Dev	95% UMPU CL Std Dev	
Female		-0.8824	-1.2840	-0.4807	0.7812	0.5709	1.1609
Male		-1.2500	-1.5003	-0.9997	0.6455	0.5046	0.8667
Diff (1-2)	Pooled	0.3676	-0.0658	0.8011	0.6991	0.5734	0.8784
Diff (1-2)	Satterthwaite	0.3676	-0.0932	0.8285			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	43	1.71	0.0944
Satterthwaite	Unequal	29.055	1.63	0.1136

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	16	27	1.46	0.3708

Question 14 has added importance due to it being the multiple-choice question to give us the closest p-value to significance. The question pertained to whether Supply Chain students felt that transportation jobs were bad for the environment, and they seemed to disagree with this sentiment. This near significance highlights the small sample size that I was able to achieve for this survey. A larger sample size of students may have given enough for the test to be shown as statistically significant. For the time being it can only be noted that students seem to feel that transportation jobs do not hurt the environment.

Variable: Q17

Q2	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
Female		17	0.8235	0.8090	0.1962	-1.0000	2.0000
Male		28	0.9286	0.8133	0.1537	-1.0000	2.0000
Diff (1-2)	Pooled		-0.1050	0.8117	0.2496		
Diff (1-2)	Satterthwaite		-0.1050		0.2492		

Q2	Method	Mean	95% CL Mean		Std Dev	95% UMPU CL Std Dev	
Female		0.8235	0.4076	1.2395	0.8090	0.5912	1.2021
Male		0.9286	0.6132	1.2439	0.8133	0.6357	1.0919
Diff (1-2)	Pooled	-0.1050	-0.6083	0.3982	0.8117	0.6657	1.0198
Diff (1-2)	Satterthwaite	-0.1050	-0.6115	0.4014			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	43	-0.42	0.6759
Satterthwaite	Unequal	34.06	-0.42	0.6761

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	27	16	1.01	1.0000

Question 17 had means that neared 1, showing that students either feel that they have a good understanding of what they would be doing in the role of a transportation job, or they are simply neutral on the subject. This tests lack of significance shows that this is only potentially true, and not been shown to be true on any statistical level.

Variable: Q18

Q2	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
Female		17	0.9412	0.9663	0.2344	-1.0000	2.0000
Male		28	0.7857	0.6299	0.1190	0	2.0000
Diff (1-2)	Pooled		0.1555	0.7724	0.2375		
Diff (1-2)	Satterthwaite		0.1555		0.2629		

Q2	Method	Mean	95% CL Mean		Std Dev	95% UMPU CL Std Dev	
Female		0.9412	0.4443	1.4380	0.9663	0.7063	1.4360
Male		0.7857	0.5414	1.0300	0.6299	0.4924	0.8458
Diff (1-2)	Pooled	0.1555	-0.3235	0.6344	0.7724	0.6336	0.9705
Diff (1-2)	Satterthwaite	0.1555	-0.3867	0.6976			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	43	0.65	0.5162
Satterthwaite	Unequal	24.36	0.59	0.5597

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	16	27	2.35	0.0482

Questions 18 asked students if they thought Supply Chain Management jobs had good benefits and students seemed to either agree with this sentiment or remained neutral, as it's mean neared 1. This perception about transportation jobs having good benefits may be a big draw to certain students so it is important to see how students feel about it.

Variable: Q20

Q2	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
Female		17	-0.5882	1.1213	0.2720	-2.0000	2.0000
Male		28	-1.0000	0.9027	0.1706	-2.0000	1.0000
Diff (1-2)	Pooled		0.4118	0.9897	0.3043		
Diff (1-2)	Satterthwaite		0.4118		0.3210		

Q2	Method	Mean	95% CL Mean		Std Dev	95% UMPU CL Std Dev	
Female		-0.5882	-1.1648	-0.0117	1.1213	0.8195	1.6663
Male		-1.0000	-1.3500	-0.6500	0.9027	0.7056	1.2120
Diff (1-2)	Pooled	0.4118	-0.2019	1.0254	0.9897	0.8118	1.2435
Diff (1-2)	Satterthwaite	0.4118	-0.2454	1.0689			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	43	1.35	0.1831
Satterthwaite	Unequal	28.457	1.28	0.2100

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	16	27	1.54	0.3109

Question 20 asked students if they felt that transportation jobs were a shrinking industry. This sentiment is clearly false, and students seemed to agree that it was false as well as the mean was nearing the “Disagree” range of responses. The test was not statistically significant showing that some students appear to be unsure though of whether these types of jobs are going away. This lack of conviction could show why some students may avoid them, as they do not hold any bias towards these jobs, but rather are afraid of lacking job security.

Variable: Q23

Q2	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
Female		17	-0.8824	0.4851	0.1176	-1.0000	1.0000
Male		28	-0.2857	0.9759	0.1844	-1.0000	1.0000
Diff (1-2)	Pooled		-0.5966	0.8280	0.2546		
Diff (1-2)	Satterthwaite		-0.5966		0.2188		

Q2	Method	Mean	95% CL Mean		Std Dev	95% UMPU CL Std Dev	
Female		-0.8824	-1.1318	-0.6330	0.4851	0.3545	0.7208
Male		-0.2857	-0.6641	0.0927	0.9759	0.7628	1.3103
Diff (1-2)	Pooled	-0.5966	-1.1100	-0.0832	0.8280	0.6791	1.0403
Diff (1-2)	Satterthwaite	-0.5966	-1.0382	-0.1551			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	43	-2.34	0.0238
Satterthwaite	Unequal	41.772	-2.73	0.0093

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	27	16	4.05	0.0051

Analyzing the data for the Yes/No questions did yield a single result that was statistically significant. Question 23, where students were asked if they would take a job in a rural town of fewer than 10,000 residents had a p-value of only 0.0238. This value is smaller than our chosen alpha of 0.05. This result combined with the deeply negative mean shows that Supply Chain students have a clear bias against jobs that would force them to live in rural small towns. Such a result shows that companies located within smaller towns should consider relocating to a larger city or area if possible as the bias disappears when the question becomes about a city the size of Fayetteville.

Discussion:

This survey has shown some areas where future research could be done based off either my findings or new questions that have been raised. The first example of this comes from the results of question 23 where students would refuse to work in a small town of less than 10,000 people but would in a city the size of Fayetteville and larger. Future research could be done to find the size of city between small town and Fayetteville where the bias disappears and could even be extended into seeing if a city could be too big. Another survey that would be interesting to see would be one where my same survey was given out, but instead of focusing on upperclassmen potentially focusing on lower classmen. This could be done either by just surveying the entire lower classmen of Supply Chain students or by surveying students at the start of SCMT 3443 before they learn about the different forms of transportation, and then resurvey them after they complete the course. An important factor to keep in mind about my data is that it comes from a world that is currently being shaken by COVID-19, a highly infectious disease that has changed the landscape of various job markets and industries. Due to this, my same survey might result in different findings in a few years when the world has returned to a state of normalcy from the pandemic.

Conclusion:

This survey set out to find whether students held biases against transportation style jobs in the Supply Chain Management job market. From the results of the statistical analysis, we can say that students do not seem to have any sentiments one way or another against any single mode of transport, style of job, or against the industry itself. While the results of the survey did show that students had a clear bias against taking a transportation job in a smaller town, this negative sentiment most likely comes purely from the size of the town and not at all form the fact that it was a transportation job the student would be taking. This can be seen by simply looking at the results from the other two questions regarding cities, where students seemed to no longer care. While I would say that my findings were the best possible given the overall amount of people I could reach with my survey, I do feel that having a larger sample size may have changed some results or made some sentiments more pronounced. For example, question 14 in my survey was comparatively close to statistical significance compared to other questions, and I feel that a larger population of survey respondents may have turned that value from one of insignificance to one of significance. Overall, though, this paper has been able to show that students have no bias against transportation jobs within the job market, despite anecdotal evidence pointing to the contrary.

References:

Leon, S., & Uddin, N. (2016). Finding supply chain management: An outreach strategy. *Supply Chain Management: An International Journal*, *21*(1), 20-44.

Appendices:

Appendix A: Survey

This survey examines several factors that explain how students view Supply Chain Management jobs with a focus on transportation jobs. The researcher is seeking to understand why students are or are not interested in transportation jobs within supply chains. The goal of this research is to find ways to improve the jobs market for all Supply Chain Management majors by finding ways employers can better attract talent.

1. Are you a supply chain major?
    a. Yes
    b. No
2. What gender do you identify as?
    a. Male
    b. Female
    c. Non-Binary
3. What is your current college level?
    a. Freshman
    b. Sophomore
    c. Junior
    d. Senior
4. Have you taken SCMT 3443 Deliver Transportation Distribution Management, or a transportation course at the University of Arkansas?
    a. Yes
    b. No
5. Pay being equal, I would take a job with a **railway-based** transportation company.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
6. Pay being equal, I would take a job with a **trucking-based** transportation company.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
7. Pay being equal, I would take a job with an **air-based** transportation company.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
8. Pay being equal, I would take a job with a **water-based** transportation company.
    a. Strongly Agree

b. Agree
c. Neutral
d. Disagree
e. Strongly Disagree

9. Pay being equal, I would take a job with a **pipeline-based** transportation company.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
10. I believe supply chain jobs are ones that should not require a college degree.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
11. Pay being equal, I would rather work on the consumer side of supply chain (Vendor, Supplier, Etc.) rather than work on the logistic side (Warehouse Manager, Dispatcher, Etc.).
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
12. If you chose **Disagree** or **Strongly Disagree** to the last question would you take a logistic facing position if it were the only one offered to you?
    a. Yes
    b. No
    c. Not Applicable
13. I feel that transportation jobs pay poorly compared to other jobs that require college degrees.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
14. I am not interested in transportation jobs because I feel that they are bad for the environment.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
15. I believe that transportation jobs involve working long hours.
    a. Strongly Agree
    b. Agree
    c. Neutral

    d. Disagree
    e. Strongly Disagree
16. I believe that transportation jobs involve working outside in the elements.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
17. I feel that I have a good understanding of what the job roles of transportation jobs are.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
18. I feel that supply chain transportation jobs have good benefits.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
19. I feel that supply chain transportation jobs **do not** have many opportunities for career growth.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
20. I feel that supply chain management transportation jobs are a shrinking industry.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
21. I found it very difficult to find internships/jobs in the field of Supply Chain Management.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree
22. I feel that supply chain management transportation jobs are **not** in good locations.
    a. Strongly Agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly Disagree

23. I would work in a supply chain transportation job in a rural town of **less than** 10,000 people.
    a. Yes
    b. No
24. I would work in a supply chain transportation job in a city the size of Fayetteville.
    a. Yes
    b. No
25. I would work in a supply chain transportation job in an urban city of **at least** 1,000,000 people.
    a. Yes
    b. No

Appendix B: Letter

May 2, 2021
Dear Potential Survey Participant,

Every year many students in the Supply Chain Major graduate from the Walton College of Business and enter the workforce. These students all have a variety of preferences and biases for certain job types and locations. Certain job types struggle to hire students, while others have more applicants than they could reasonably hire.

Drew Mahosky, an undergraduate student at the Walton College of Business is working on his honors thesis. As part of this research he is trying to understand what factors are important for students, and what biases they hold toward different types of jobs in the market. To do this he will provide a survey to Supply Chain Management students to better understand how they feel about the different jobs they could take after they graduate.

You are being provided a survey or survey link. The survey should take approximately 7 minutes to complete. The survey is only being offered to select students, so your participation is important. The survey should be completed by March 17th at 5 pm.

If there are questions please contact Drew Mahosky directly at dlmahosk@uark.edu.

Best Regards,
[Professor Name]
SURVEY LINK:
https://waltonuark.az1.qualtrics.com/jfe/form/SV_2lYABPCId8kbzhQ