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*Term Project*

*–The Perfect Candidate for the Job–*

Decision Support Systems

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## Introduction

We all have to make decisions in life. Some decisions are easier than others and some require little knowledge to make the decision due to personal bias. However, some decisions are much harder. These decisions require the processing of much information and avoiding bias of the alternatives. These decisions are where Decision Support Systems can help. For my project I decided to talk to the person in charge of hiring at a company and get information on what they look for and what is most important. I set down with her and asked her what was most important when she is interviewing someone. Since she interviews people for a customer service/front end job I expected her requirements to be focused more on interaction than on education. This did come to be true and she listed out each category that she found to be most important when meeting an interviewee. For each category I asked her to give me some subcategories, she did and she even had a few subcategories that had their own subcategories. Once we had a list of categories, subcategories and further subbed categories I asked her to weight each top-level category with the total of all top-level categories having a total of 100. We then took the point value of the top-level categories and split its points up among the subcategories and finally to the third-level categories. We now had a tree of categories and subcategories that defined what she looked for when hiring a customer service agent. To further show what was learned during this interview, I have typed out our tree and it is presented below.

- Availability (30%)
  - School Schedule (25%)
  - Children (5%)
- Attitude (25%)
  - Personality (20%)
    - Smile (4%)
    - Friendly (4%)
    - Down to Earth (4%)
    - Enthusiasm (4%)
    - Charisma (4%)
  - Team Spirit (2.5%)
  - Shy/Outspoken (2.5%)
- Appearance (15%)
  - Hair (2%)
  - Piercings (3%)
  - Tattoos (3%)
  - Clothing (3%)
  - Clean (4%)
- Communication (15%)
  - Proper English (4%)
  - Slang (3%)
  - Eye Contact (4%)
  - Bilingual (4%)

- Ethics (10%)
  - Punctuality (5%)
  - Reliability (5%)
- Experience (5%)
  - Computer (1%)
  - Phone (1%)
  - Cash Register (1%)
  - Customer Service (1%)
  - Education (1%)
    - High School/GED (0.75%)
    - Associates (0.15%)
    - Bachelors (0.04%)
    - Masters (0.04%)
    - Doctorate (0.02%)

From the tree above you can see that since this is a customer service job that experience was not as important. I asked her about this and she stated that they often will hire individuals in school, and that since this is an entry-level job, that education and experience are not usually expected; however, they are an extra bonus if an interviewee has it. I found that the most important aspect of a new staff member for her was that they have a good attitude, a friendly disposition, and a way with words to help up sale items and ensure that the customer can easily understand them when they are talking at the counter. Most importantly was that they would be available when needed to work. Since she deals with mostly individuals in school, whether that be high school or college, she needs individuals with school schedules that allow them to work at least in the afternoon or morning time and that can be available when needed and will try to ensure that their school schedule is accommodating to the job.

Now that I understand her requirements and what she looks for in an interviewee I started working on a Decision Support System that would benefit her and facilitate helping her in finding the best candidate and ensure that all candidates have an equal chance for the job, regardless of bias that can arise in the interview process. To do this I first created my problem hierarchy, as seen above. During the interview process I had her define the importance of each category by giving her 100% to divide as she found most important across the different categories and then having the subcategories given values using the given values of their parent category. Since, for security and policy reasons, I could not get information on past applicants, I decided to make up three fake candidates that represent people that I have seen in the past apply for jobs. Using these three candidates I created an Excel Spreadsheet that allowed for a clean presentation of the candidates and the weighted values and categories that we defined during the interview. I followed that by creating an Expert Choice Model and once all judgments have been made synthesized the results to come up with my best choices.

## Spreadsheet Model

To start I decided to map out my categories in an Excel Spreadsheet. I listed the categories out horizontally across the top and than listed my candidates, or alternatives, vertically under the categories. I than filled in the spreadsheet with information on the candidates that matched past data that I have seen in candidates that have applied for past jobs. The first part of my spreadsheet is just the physical representation of the candidates and what would be noted or seen by an interviewer, this resulted in the following; however, due to the length of the spreadsheet horizontally it has been broken into segments below.

Job Seekers	Availability		Attitude						
	School Schedule	Children	Personality					Team Spirit	Shy/Outspoken
			Smile	Friendly	Down to Earth	Enthusiasm	Charisma		
ohn Doe, 17	Limiting	No	Yes	Yes	Yes	No	No	Yes	Outspoken
ack Johnson, 25	No	Yes, 1	No	Yes	No	Yes	No	No	Shy
isa Goodall, 32	Yes, Online	Yes, 3	No	Yes	Yes	No	No	Yes	Balanced
Veigt:	25.00%	5.00%	4.00%	4.00%	4.00%	4.00%	4.00%	2.50%	2.50%
Weight Breakdown:	Very Little - 5	Yes, 3+ - 1							Balanced - 2.5
	Limiting - 12	Yes, 2 - 2							Outspoken - 1
	Online - 20	Yes, 1 - 4							Shy - 0.5
	No - 25	No - 5							

Appearance					Communication			
Hair	Piercings	Tattoos	Clothe	Clean	Proper English	Slang	Eye Contact	Bilingual
(not including ear)								
Shaved	Nose/Eye	Yes	Good	Yes	Yes	Some	Yes	No
Shaved	No	No	Excellent	Yes	Yes	None	No	Yes, Spanish
Shaved	No	Yes	Excellent	Yes	No	None	Yes	Yes, French
2.00%	3.00%	3.00%	3.00%	4.00%	4.00%	3.00%	4.00%	4.00%
Shy - 0	Facial - 0		Bad - 0			Yes - 0		Spanish - 4
Outspoken - 1	No - 3		Good - 1.5			Some - 1.5		French - 3
Shy - 2			Excellent - 3			None - 3		Other - 2

Ethics		Experience								
Punctuality	Reliability	Education					Computers	Phone	Register	Customer Service
		HS/GED	Associates	Bachelors	Masters	Doctorate				
Shy	Yes	YES	NO	NO	NO	NO	Some	High	None	High
Shy	Yes	YES	YES	YES	NO	NO	None	High	High	High
Shy	No	Yes	YES	YES	YES	NO	High	High	High	High
5.00%	5.00%	0.75%	0.15%	0.04%	0.04%	0.02%	1.00%	1.00%	1.00%	1.00%
Shy - 0							High - 1	High - 1	High - 1	High - 1
Shy - 2.5							Some - 0.5	Some - 0.5	Some - 0.5	Some - 0.5
Shy - 5							none - 0	none - 0	none - 0	none - 0

Looking at the spreadsheet above you can see the categories and subcategories divided amongst the top column, then each row has a candidate and each candidate row has the answer or attribute related for each category. Under the list of candidates you can see the percentage of each category, these values are the same as presented in the Introduction section of this document. If needed, under each percentage is a breakdown of the weight and how each weight is considered for each category.

Now that I had each of my candidates defined to meet the categories defined I copied the rows and pasted them lower in the document, and changed the values into the weighted values that are defined under each section. This presented the same document format but with a number for each candidate's category. These numbers were summed up and the individual with the highest number would be our best candidate for the job. The result is given below.

Job Seeker	Hire Rank
John Doe, 17	59.25
Jack Johnson, 25	77.44
Lisa Goodall, 32	63.48

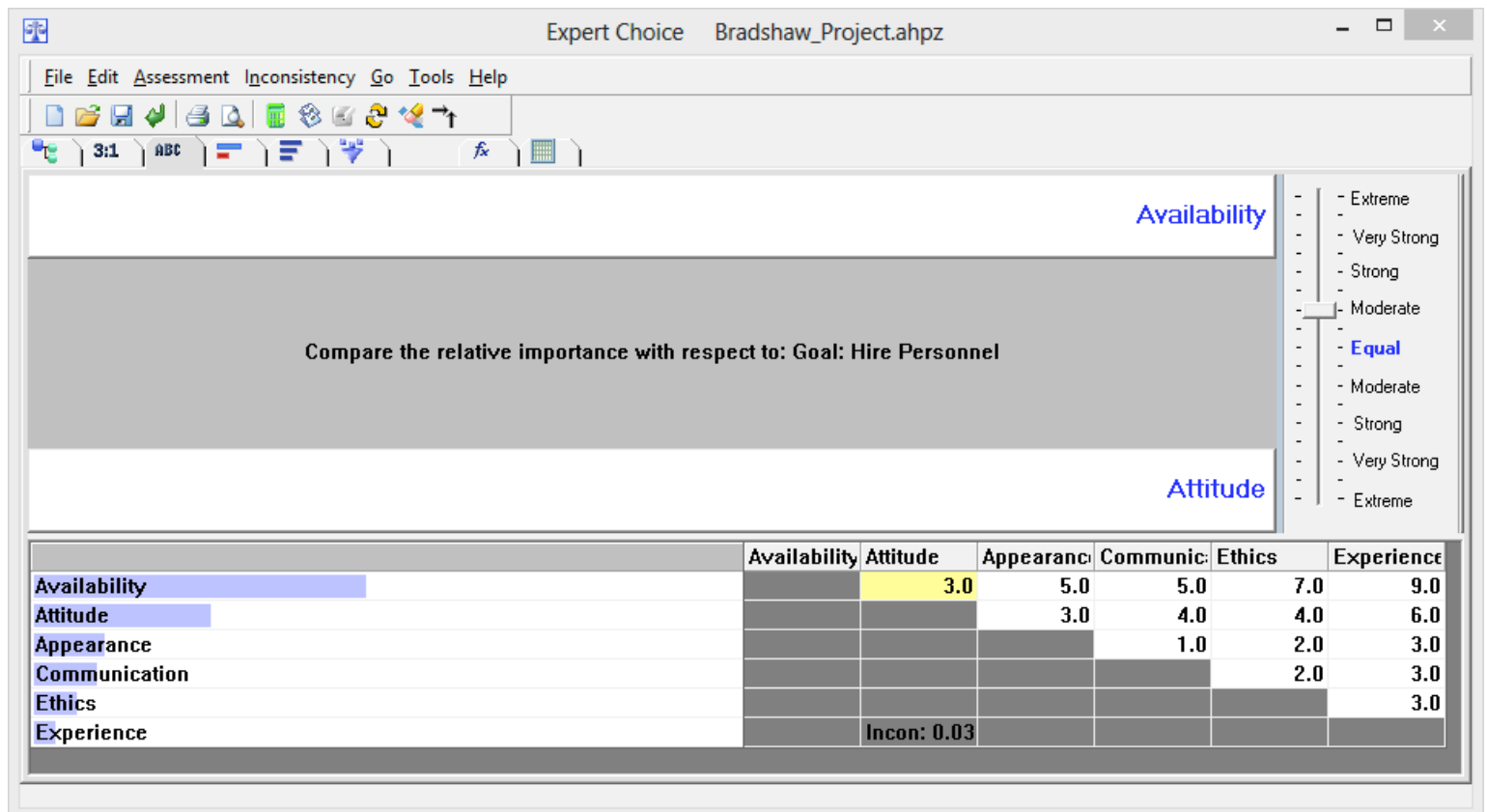
As we can see Jack Johnson, 25 came in the top result followed by Lisa Goodall, 32, and finally in last is John Doe, 17. Just by looking at the candidates I can infer that Jack got the top result since he had no school schedule, had a pretty good personality, an excellent appearance for the interview, an excellent communication skill and great experience in Customer Service. Lisa came in second due to her lack of communication skills and personality. John came in last since he has a limiting school schedule that prevented much work, and had a few appearance problems that were visibly noted during the interview.

The Spreadsheet Model, in my opinion, is the toughest to generate, since everything is created manually and requires much formatting to result in a good looking final product. The full Spreadsheet Model is included with this project submission as an XLSX file. It includes the full list of conditions and weighted values as well as the conversion of attributes to numeric form for weighing the candidates. I chose to do the Spreadsheet model first since it is easier to transform my handwritten notes from our interview into a Spreadsheet Model and then use the Spreadsheet Model to help in defining the Expert Choice Model. The results from the Spreadsheet Model were as expected and best candidate did get the job since he had the most important qualifications for this job. Lisa and John are both students and therefore had limiting schedules, however, Lisa is an online student and therefore has an easier schedule to work with, and thus gained an edge over John, even with her lack of communication skills. John could get a better result if he had come to the interview in a more professional way with no piercings and non-spiked

hair. However, in the end Jack is the best candidate with his free schedule and great skills.

## Expert Choice Model

Now that I had my Spreadsheet Model complete I went to create the Expert Choice Model. Using Expert Choice 11.5 I created a new project with a goal of Hiring a Personnel. I started by adding a child to my goal for each category and than all the child elements for the subcategories as needed. Once I had all of the categories I did a Pairwise Comparison of each category and subcategory group. All Pairwise comparisons maintained an Inconsistency of well below 0.1.



I chose to use the Pairwise comparison since it is the easiest to understand and has a visual feel that is easy to follow and when following the process in order provides an easy to understand flow that allows for quick comparison. Even though I did not use it for this project since all of my final Pairwise comparisons had very low Inconsistencies, I also like the easy to use Inconsistency menu that allows for a quick view of which object is causing the most inconsistency so that it can be corrected if needed. I have tried the other comparative methods and found it to be the easiest to use, therefore I usually try to use it, except for choices that had only two categories to compare where it was easier to use the Pairwise Graphical Comparison that offered a simple pie chart that allowed you to compare the results. I found that the

verbal version was easier since it provided a simple Equal, Moderate, Strong... system that was easy to understand.

Once I had all of my categories compared I needed to review my alternatives. To do this I chose to do a questionnaire for each category for my alternatives. I brought up the questionnaire menu for each bottom-level category and compared my three alternatives based on the category. I did this for each bottom-level category and after that I had my final result for my Expert Choice Model and was ready to synthesize the results.

**Questionnaire**

File Edit Assessment Go Help

**Compare the relative preference**

JOHN DOE, 17 versus JACK JOHNSON, 25

with respect to: Schedule (L: .833)

1	John Doe, 17	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Jack Johnson, 25
2	John Doe, 17	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Lisa Goodall, 32
3	Jack Johnson, 25	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Lisa Goodall, 32

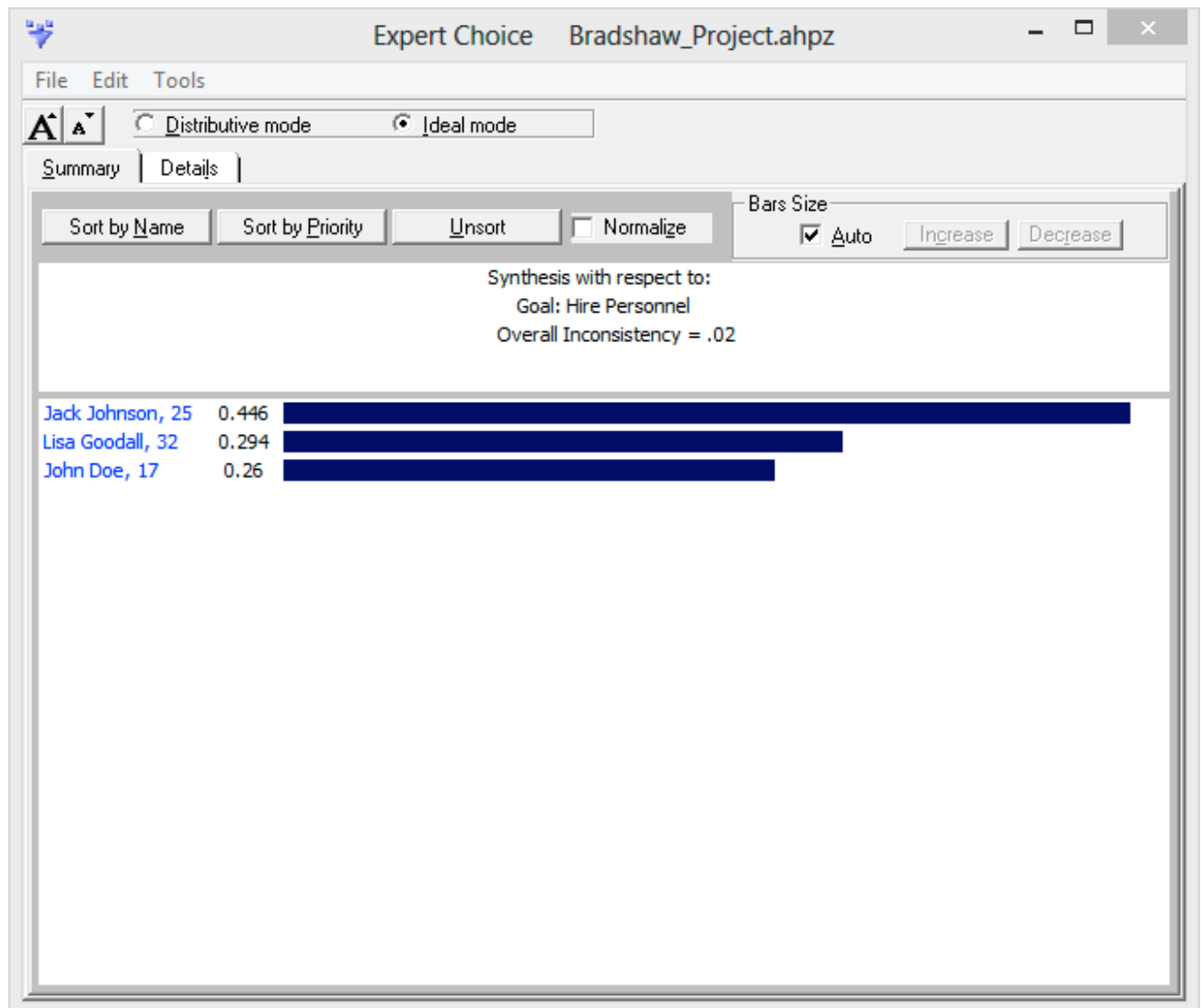
1 = Equal 3 = Moderate 5 = Strong 7 = Very Strong 9 = Extreme

Invert Calculate Close Cancel

I chose to use the questionnaire since, in my opinion; it is the easiest to do since it has a simple versus interface that allows you to compare two of the candidates at a time in respect to a certain category. It is very easy to understand and yields very accurate results since the comparison is simple to understand. I also like the fact that once I finish a questionnaire on an alternative that the alternative list on the right side of the Expert Choice window updates to compare the candidates in a graphical form. This allows for a quick comparison of the three candidates based on a certain category and also helps avoid accidental mistakes since I know roughly one category at a time who is the better candidate and this just verifies that.

John Doe, 17	.260
Jack Johnson, 25	.446
Lisa Goodall, 32	.294

Once I had all the data and judgments in Expert Choice I was ready to synthesize the data and get my final results. I Synthesized with respect to Goal and found my results.



My results found that Jack Johnson was the best choice with 0.446, followed by Lisa Goodall with 0.294 and lastly John Doe with 0.26. As mentioned earlier my Inconsistency was always low during the Pairwise Comparison and this is shown with my Overall Inconsistency being only 0.02. These values are very consistent with my expectations from my Excel Spreadsheet and are nearly a perfect differentiation of the two models.

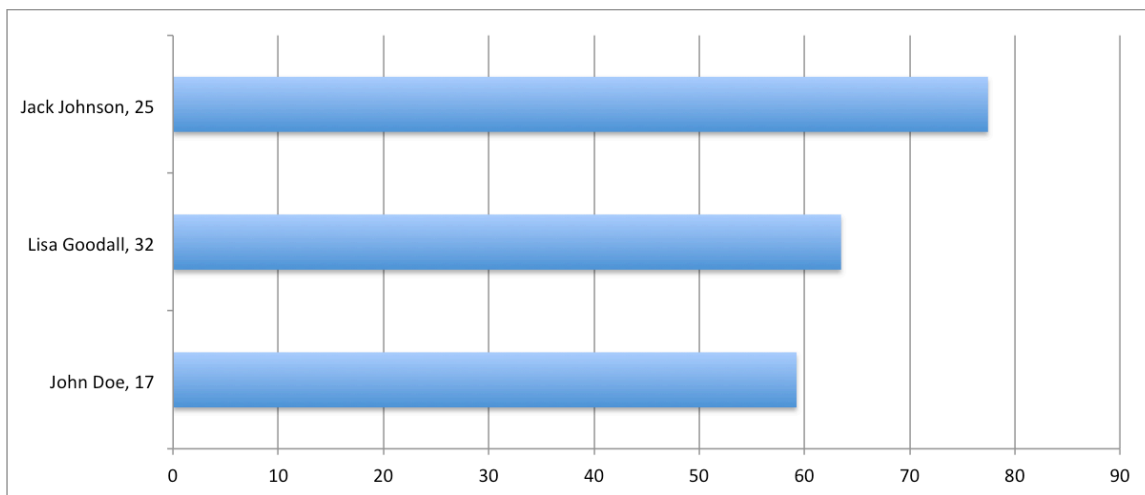
In the end Expert Choice made setting up the Model easier since it did most of the formatting and collection of data itself with easy to use questionnaires and comparisons. It is the easiest to use and since I can always change my alternatives



to others in the future it is very easy to reuse, compared to the Spreadsheet model that would require most data to be deleted and recreated it.

## Model Comparison

After finishing both models I found that both had very similar results. Which helps to ensure that my data is correct in both models. Since the Expert Choice system plotted the data in a bar graph for a visual representation of the data, I decided to do that with the Spreadsheet model to compare both visually side by side. After doing that I found that the results are nearly perfect. You can see this from the two bar graphs below. The first one is the Excel Spreadsheet version of the data from my Spreadsheet Model. The second one is from Expert Choice.



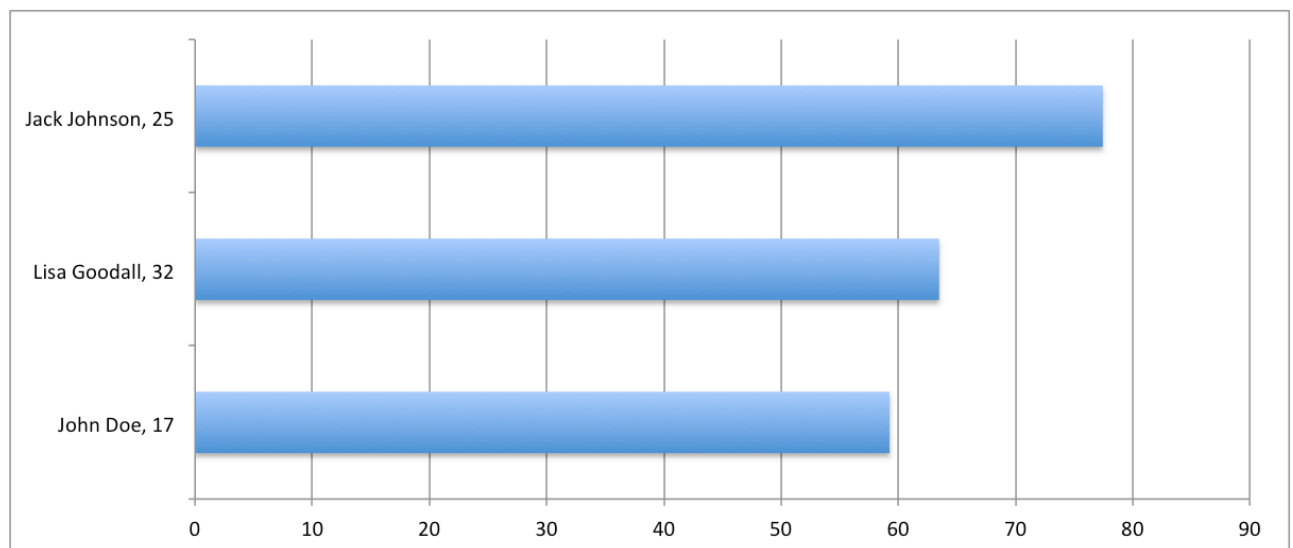
As you can see from the two bar graphs Jack Johnson is well ahead of the other two alternatives and than Lisa Goodall is second with John Doe coming in last, but just a little short of Lisa. Both bar graphs show this same structure and general results. Leading to show that both models resulted in very similar results.

I believe that the results are very similar due to the very low Inconsistency rate in Expert Choice and the well-defined categories and weight from my interview that helped ensure that the data can easily be applied to the categories and the weighted values can easily be deciphered and shown in the Pairwise Comparison of Expert Choice.

Both Models yielded a recommendation of hiring Jack Johnson and this met my expectation. Jack offered many of the important aspects that were given by the person I interviewed. He offered great availability, excellent communication a pretty good personality and relatively good experience and ethics. John being the lowest did meet my expectations. He was a student and had a limiting schedule and showed up to the interview far from professional. Lisa would be a good choice, but her attitude and lack of communication skills made her lose some points compared to Jack, but still maintain a lead due to appearance over John. The results from the models greatly met my expectation and yielded the results I would expect if I were hiring for a customer service position and had these three candidates.

## Conclusion

After starting my research with the interview of the person who hires for customer service positions at a local company I found that she looks for numerous categories when judging people for a position. I discovered that her most important categories were their Availability, Attitude, Appearance and Communication. I found that these are the most important categories since she is hiring people that will be the first face that customers see when they visit her establishment. Therefore the new hires must have great communication skills and provide a friendly and warm appearance that makes the customers comfortable when visiting the establishment. I found out that experience was not as important since the job frequently hired students from high school and college.



Once I had my Spreadsheet Model complete I quickly found out that Jack Johnson was the clear winner. After reviewing and the alternatives that I created and studying each one I found that Jack Johnson would be my personal choice as well, since he had great communication skills, a very wide availability, and a good appearance and attitude toward work. My Excel Spreadsheet Model was a very good judge of the final results that I would personally arrive at and what the

Spreadsheet Model came up with as well. This was a great result for the project and provided a high level of validity to my model.



My Expert Choice Model was also very accurate and revealed the same result that Jack Johnson would be the best choice. It provided almost an exact match to my Spreadsheet model and had a super low Inconsistency Rate of only 0.02. I found that the Expert Choice was the easiest to use since it provided easy to use questionnaires and comparison tools that helped facilitate quick evaluation of the data.

In the end my results were very accurate compared to choices that one would make without the use of a Decision Support System and my models provided very low inconsistency rates and had matching results even using different methods of accumulating the data. This helps to validate that both models yielded excellent results and that the results were accurate and met real world expectations.