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Minitab Project - 1

INFS 608 Applied Statistics

Overview: The National Health Care Association is looking to address its concerns related to the projected shortage of nurses. To assist with the research into this issue, the association performed a study and sent out a job satisfaction survey to 50 nurses throughout the country. The nurses were asked to rate their degree of satisfaction, on a scale of 0 to 100, in the following 3 aspects:

* Pay
* Work
* Promotion opportunities (Promotion)

Note that larger values on the scale indicate a higher level of satisfaction.

The surveys were also dispersed among the following 3 hospital types:

* Private
* Veterans Association (VA)
* University

1. Initial Findings:

Based on the data collected after the survey was concluded, we were able to determine 3 things:

* The most satisfying aspect
* The least satisfying aspect
* Potential improvement options

|  |  |  |
| --- | --- | --- |
| **Initial Statistical Values for Surveyed Aspects** | | |
| **Surveyed Aspects** | **Mean** | **Standard Deviation** |
| Work | 79.80 | 8.29 |
| Pay | 54.46 | 14.75 |
| Promotion | 58.48 | 16.00 |

Figure 1

As shown in Figure 1 above and Figures 2-4 below, we can determine that the most satisfying aspect surveyed was Work. This was verified given that the mean value is 79.80, which is the highest of the 3 provided mean values. Further confirmation was provided in Figure 1 given that the standard deviation was 8.29, which is the lowest of the 3 calculated standard deviations. The lower standard deviation means that the values in the provided data were closer to the mean value. Now that the most satisfying aspect has been discussed, it is time to discuss the least satisfying aspect. Once again, we can look to Figure 1 for that information. The least satisfying surveyed aspect appears to be Pay which has a mean value of 54.46 and while its standard deviation is higher than the value for the Work aspect, it is still low enough to feel confident that the values in aspect are relatively close to the mean value.

Based on this data, along with the data provided on the last aspect, Promotion, having a mean value of 58.48 with a standard deviation of 16.00, it can be reasonably determined that both the Pay and Promotion aspects should be examined for improvement opportunities. One such opportunity would be to implement or provide access to programs that potentially increase the nurses’ chances of career advancement. The resulting career advancement options would provide avenues for pay increase and promotion; Therefore, this leads us to a confident projection of higher scores for the Pay and Promotion aspects during any future surveys.



Figure 2



Figure 3



Figure 4

# A Difference of Opinion

Now that we have provided a foundational explanation of the survey’s data, it is time to analyze how the varying responses may have affected the results, if at all.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variance Values for Surveyed Aspects** |  |  |  |  |  |  |
| **Aspects** | **Standard Deviation** | **Variance** | **1st Quartile** | **Median** | **3rd Quartile** | **IQR** |
| Work | 8.29 | 68.69 | 72.00 | 82.00 | 87.00 | 15.00 |
| Pay | 14.75 | 217.48 | 44.50 | 55.50 | 60.50 | 16.00 |
| Promotion | 16.00 | 255.97 | 50.50 | 58.50 | 68.00 | 17.50 |

Figure 5

We will begin our analysis by discussing the values in Figure 5 above, more specifically the values related to the Promotion aspect. As you can see, the Promotion aspect has the highest value for each of the following:

* Standard Deviation
* Variance
* Interquartile Range (IQR)

The higher standard deviation (16.00) means that the values for the Promotion data were further from their respective mean than say, the Work or Pay aspects. Based on this result we can begin to see that survey results for this aspect vary more when compared to the other two. Further proof of this can be shown by examining the variance. Given that the variance is 255.97, we can conclude once again that the results are further away from their respective mean. The high variance also means that results of the data are relatively distant from each other. Our third and final value analysis relates to the Interquartile Range or IQR. The IQR is the difference between 1st and 3rd quartiles, and given that the IQR is 17.50, it further shows how spread out the results are for the Promotion aspect. Based on this information, we can confidently conclude that the Promotion aspect’s survey results were the most varied of the 3.

# Breakdown by Hospital

Now we will examine the 3 aspects and what the results when they are broken down by each type of hospital.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Statistical Values by Aspect by Hospital** |  |  |  |  |  |  |  |  |
| **Aspect** | **Hospital** | **Mean** | **Standard Deviation** | **Variance** | **Q1** | **Median** | **Q3** | **IQR** |
| Work | Private | 79.32 | 8.04 | 64.56 | 72 | 82 | 87 | 15 |
|  | University | 79.71 | 7.27 | 52.84 | 73.5 | 78 | 87.25 | 13.75 |
|  | VA | 80.41 | 9.7 | 94.13 | 72 | 82 | 88 | 16 |
|  |  |  |  |  |  |  |  |  |
| Pay | Private | 48.95 | 11.53 | 132.94 | 42 | 49 | 59 | 17 |
|  | University | 61.71 | 15.7 | 246.37 | 52.5 | 57.5 | 72.5 | 20 |
|  | VA | 54.65 | 15.3 | 234.12 | 39.5 | 56 | 69 | 29.5 |
|  |  |  |  |  |  |  |  |  |
| Promotion | Private | 62.42 | 13.2 | 174.26 | 54 | 63 | 68 | 14 |
|  | University | 52.57 | 19.43 | 377.49 | 44.75 | 51.5 | 63.25 | 18.5 |
|  | VA | 58.94 | 15.23 | 231.93 | 52 | 58 | 71 | 19 |

Figure 6

By dividing the data up in this manner as shown Figure 6 above, we can get a better understanding of how the survey results varied at each type of hospital. As it stands now, it appears that the nurses at each type of hospital have a high level of job satisfaction as it relates to the Work aspect. The last 2, on the other hand, are showing lower mean values across the board. These values also still show that Promotion and Pay are still a major concern to the nurses who took the survey, regardless of the hospital type. Given that the standard deviation and variance are relatively high for Pay and Promotion compared to the Work aspect, we cannot reliably recommend any course of action to improve those two aspects. The reason for this is since the standard deviation, variance is so high, the data results are too far apart to make a reliable recommendation based on how this data is provided.

# Final Thoughts

Given that there was such a high level of variance for the results related to Pay and Promotion, the scatterplot shown in Figure 7 below would be the ideal method to represent and discuss any final thoughts related to the survey data.



Figure 7

I generated 2 scatterplots using the Work aspect to see how it related to the Promotion and Pay aspects respectively. Both graphs verify that the survey results for both Promotion and Pay are varied, though there appears to be a relationship between these two and the Work aspect. It appears there is a negative correlation between how the nurses felt about the work itself and their opportunities for promotion. On the other hand, there appears to be a positive correlation between how the nurses felt about work and pay, though pay satisfaction rating is still relatively lower. One possible solution to improve these ratings to create a process that would create a positive correlation between the Work and Promotion aspects. This should also raise the ratings for the Pay aspect as a side effect.