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APAN5700
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Midterm Assignment

Describe the kinds of information that is collected (e.g., demographics, etc.), and how the data is reported (binary, continuous, categorical, etc).

There are 4 different types of information collected:

- **Demographic** – descriptive data for individuals in company
- **Employment** – recorded data on employee work information
- **Job Performance –** data on how an individual and their manager feel about their work
- **Job Happiness** – data that indicates how an individual feels about their workplace environment

Information about	Variable Name	Var. Type	Data Type
Demographic	Age	Numeric	Continuous
Demographic	Distance From Home	Numeric	Continuous
Demographic	Gender	Categorical	Binary
Demographic	Monthly Income	Numeric	Continuous
Demographic	Over 18	Categorical	Binary
Employment	Deparmtent	Categorical	Nominal
Employment	Education	Categorical	Ordinal
Employment	Education Field	Categorical	Nominal
Employment	EmployeeCount	Categorical	Nominal
Employment	EmployeeNumber	Categorical	Nominal
Employment	Job Role	Categorical	Nominal
Employment	Marital Status	Categorical	Nominal
Employment	number of companies worked	Numeric	Continuous
Employment	stock option level	Categorical	Ordinal
Employment	total working years	Numeric	Continuous
Employment	years at company	Numeric	Continuous
Employment	years in current role	Numeric	Continuous
Employment	years with current manager	Numeric	Continuous
Employment	JobLevel	Categorical	Ordinal
Employment	Attrition	Categorical	Binary
Job Happiness	environment satisfaction	Categorical	Ordinal
Job Happiness	job involvement	Categorical	Ordinal
Job Happiness	job satisfaction	Categorical	Ordinal
Job Happiness	relationship satisfaction	Categorical	Ordinal
Job Happiness	work life balance	Categorical	Ordinal
Job Performance	Business Travel	Categorical	Nominal
Job Performance	Over Time	Categorical	Binary
Job Performance	percent salary hike	Numeric	Continuous
Job Performance	performance rating	Categorical	Ordinal

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Job Performance	training times last year	Numeric	Continuous
Job Performance	years since last promotion	Numeric	Continuous

Do the data support the two assertions of the head of R&D as described in the problem statement? Explain why or why not.

The head of R&D asserted that the talent that perform well (evaluated on performance review, and salary increase) and, have been with the company for a long period of time are more likely to leave the company causing a disproportionately high attrition rate.

- Assertion 1 for the problem statement is partially true because employees with a rating of 4 – outstanding have 17% attrition rate while employees receiving rating of 3 – Excellent have a 13% attrition rate. However, Figure 1 below shows the number of people with salary hike grouped by attrition which indicates that the number of people who do leave is significantly below those that end up staying even with salary increases.

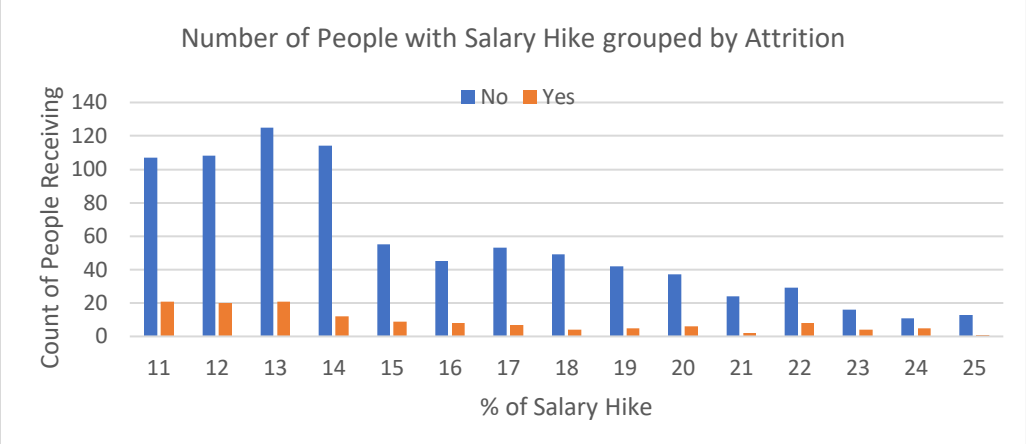
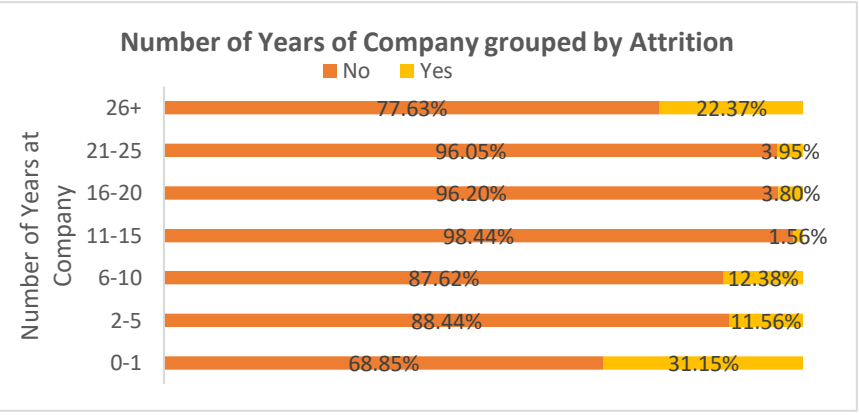


Figure 1

- Assertion 2 for the problem statement is incorrect because although the average number of years at a company is approximately 7 years, 16.73% still remain at the company for more than 7 years. Furthermore, the highest attrition seems to be employees working within 0 – 1 years, followed by those working with more than 26 years of at the company (which could potentially be for retirement purposes). Additionally people within the company from 2-5 years or 6 -10 show an average attrition rate of ~12% while the

Figure 2



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people who are in the 11-15, 16-20, and 21-25 years bucket show a lower attrition rate of an average of ~2.5%

Furthermore, when comparing the R&D Department's attrition rate with other departments within the company, the other departments (i.e. Sales & HR) seem to be around ~20% while the R&D department's attrition rate is ~14% as shown in figure 3. Although this could be because the R&D has a significantly higher head count than the other departments. Additionally, when comparing with industry standards, 13.2% is an expected attrition rate in Technology sector (Information Week, 2020).

Figure 3

Department	Attrition	
Human Resources	No	80.95
	Yes	19.05
Research & Development	No	86.16
	Yes	13.84
Sales	No	79.37
	Yes	20.63

Summarize the key metrics for each of the three divisions (e.g., total salary, number of employees, demographics, etc). Show your analysis.

Demographic data will help HR maintain diversity across the various divisions. The key demographic metrics for each division is shown below:

	HR	R&D	Sales
# of Employees	63	961	446
F:M Ratio %	32%:68%	39%:61%	42%:58%
Age Groups			
18-21	2%	2%	4%
22-29	19%	20%	18%
30-38	40%	41%	45%
40-49	27%	24%	23%
50-60+	13%	12%	11%
Education			
1 'Below College'	8%	12%	11%
2 'College'	21%	19%	20%
3 'Bachelor'	43%	39%	37%
4 'Master'	24%	27%	29%
5 'Doctor'	5%	3%	3%
% with Technical Degree	6%	10%	8%
Income Level			
1-2K	41%	31%	15%
3K-5K	22%	35%	37%
6K-9K	16%	13%	31%
10K-14K	21%	20%	17%
15K+	16%	10%	7%

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R&D represents 66% of total employees in the company followed by 30% in Sales and, 4% HR. It is important to maintain a good distribution in division based on company needs.
The distribution is fairly consistent across divisions:

- Female to male ratio is approximately 35%:65%.
- The majority of employees are 30 – 38 years old.
- The majority of employees have a bachelor degree while R&D and Sales have a high number of employees holding a masters degree. R&D seems to have a higher number of technical degree, this is a key metric for a technical division as lower percentage may be a cause for concern on quality of output.

When reviewing job related metrics, I will split it into two subsets: (*see Appendix for details)*

- Division Performance relays information regarding how individuals are performing within their field
    - *Number of different roles* will represent various progression an individual can take within the company. R&D has the most number of roles (6) while HR and Sales only have 2 and 3 roles respectively. Furthermore, *number of managerial roles* is how individuals can lead others within the organization. R&D has 3 managerial roles while HR & Sales only have one.
    - *Job Involvement,* measured from 1-4 (1 being low and four being very high)*,* will represent how involved individuals feel they are with their job which is important to understanding attentiveness in the workplace. Within all three divisions, approximately 60% of each division has rated a high level of involvement.
    - *Average number of years in company and average number of years in current role* will be helpful to monitor on a year over year basis to indicate employee retention.
        - HR & Sales employees have stayed approximately 7.2 years while R&D employees show 6.8 years at a company.
        - HR has the least number of years in current role 3.54 while both Sales & R&D indicate an average of over 4 years.
    - *Average performance rating* depicts how employees are performing in the overall division. This is critical to monitor over time to not see a decrease. Employees for all division have a score of either 3 – Excellent or 4 – Outstanding. 16% of employees within the R&D division received an outstanding score, while HR & Sales both have ~14% of their employees receive an outstanding score.

This should be measured against percent salary hike as consistent high performance rating would warrant salary increase and, potential promotion.

- Job Satisfaction outlines information regarding how an individual feel about their current work place.
    - Employee satisfaction is important to measure to understand the division's overall happiness.
        - *Average job satisfaction* is fairly consistent within the three division showing an average of 2.7 which represents Medium. However, R&D and Sales both show a larger percentage (31% and 33% respectively) for 4 - very high satisfaction compared to only 27% of employees in HR.
        - *Average environment satisfaction* is 2.7 across all divisions while 33% of R&D employees rated a 4 – very high satisfaction compared to 28% for Sales, and 22% for HR.
        - *Average relationship satisfaction* is around 2.8 across all divisions while 32% of HR employees rated a 4 – very high satisfaction compared to R&D at 29% and Sales at 30%. This could include some action may need to be taken to increase overall relationship satisfaction within R&D.
    - *Average work life balance* will show how employees feel they are managing their workload with other areas of life. This should be carefully monitored and compared on a year over year basis to see changes. R&D has the lowest at 2.7 while Sales and HR rate 2.8 and 2.9. Only 9% of R&D rated a 4 – best; while 12% of Sales employees rated 4 and 16% of HR employees.
    - *Average number of years since last promotion* for HR is the shortest being 1.78 while for R&D, it is 2.14 and for Sales, it is 2.35.

Your boss, the Chief Analytics Officer, wants to demonstrate the value of talent analytics to the executive committee. You do not have resources to support all three divisions. Which division will you support to prove the value that you can generate? Explain the rationale for your choice. (15 points)

I would recommend beginning with the Sales Department, here is my justification:

- Choosing the correct sample size is critical to ensuring that the results will be representative of the population of our dataset. Choosing a small sample size would

mean that the results could be skewed to that particular subset whereas a large sample size would make the research more complex. (Qualtrics, 2020)

- Three factors will be required to calculate the minimum sample size for the research:
  - *Margin of Error* - the range the results would fall between if our confidence level held true (a standard of 5% is chosen)
  - *Confidence Level* - how confident we need to be that the actual mean falls within your margin of error (a standard of 95% is chosen)
  - *Population size* – how many number of people in total would it represent (in this case, there are 1470 employees in the company)
  - ➢ When calculating this, the ideal sample size would be at least *305 participants*.
- Therefore, HR's headcount of 63 employees would be too small, and R&D's headcount of 961 would be more than triple the ideal sample size; whereas Sales has a headcount of 446 employees, representing ~30% of the company.

- Sales also has the highest attrition rate of 20.63% (shown in Figure 3.)
- Sales KPI are often more quickly quantifiable in a seasonal cycle as their efforts often relates to relationships with external clients and, products/services being sold whereas the R&D and HR division impact life cycle is typically longer for changes in KPI to be seen. Furthermore, by making changes to improve the overall cultural practices within sales, perhaps the sales processes will be optimized, thereby, increasing retention.

Identify at least one subset of employees in the division that you chose to support, who are at disproportionate risk for leaving based on the data provided. You can use any tool that you wish, or the work can be conducted with pivot tables in Excel. (10 points)

Figure 4

JobRole	Attrition	
Manager	No	95.0
	Yes	5.0
Sales Executive	No	83.0
	Yes	17.0
Sales Representative	No	60.0
	Yes	40.0

I believe the best subset to support in this division would be Sales Representative who make up 19% of the division but have a 40% attrition rate compared to the two other roles (as shown in figure 4.) Furthermore, Sales Representatives roles make an average of $2,626 in monthly income while those who did end up leaving made 11% less ($2,365).

When reviewing survey data on job happiness (i.e. environment satisfaction, job satisfaction, relationship satisfaction, and work-life balance scores), Sales Representatives who leave seem to have an average of 0.4 less in Job Satisfaction score than those who remain at the company; however, there Relationship Satisfaction and Work Life Balance score is, on average, higher than those who remain (as shown in figure 5). Although the average performance rating for those who do leave and those who do not are only 0.1 difference, the average years at the company, years in current role, and years with current manager are almost ~1 year less between the two (with those who end up leaving staying for a shorter time period.) Furthermore, those who do leave indicate an average

year since last promotion being 0.6 while those who stay have 1.4 years. Those who leave also rated their job involvement 0.3 scores lower than those who stay and receive less training times per year.

To summarize, it seems sales representative who leave enjoy the work lifestyle as shown from average work life balance, environment satisfaction, and relationship satisfaction scores. However, they are less engaged with work shown from average job satisfaction and job involvement scores. Additionally, even though they receive a similar performance rating, they seem to, on average, make less in monthly income and, end up staying in the company for a significantly less amount of time.

Figure 5:

Job Happiness Survey Responses	No	Yes
Average of JobSatisfaction	2.9	2.5
Average of EnvironmentSatisfaction	2.8	2.7
Average of RelationshipSatisfaction	2.5	2.8
Average of WorkLifeBalance	2.8	3.1
Employment & Performance Metrics		
Average of YearsAtCompany	3.5	2.1
Average of YearsInCurrentRole	2.5	1.2
Average of YearsSinceLastPromotion	1.4	0.6
Average of YearsWithCurrManager	2.0	1.2
Average of PerformanceRating	3.2	3.1
Average of PercentSalaryHike	16.0	15.2
Average of TrainingTimesLastYear	3.1	2.9
Average of JobInvolvement	2.8	2.5

What results and insights did you find most unexpected and interesting? (5 points)

- I found it surprising to see that Sales Representatives enjoy their experience in the work place and receive a decent performance rating nevertheless, still have a higher attrition rate. This makes me speculate that they could not be getting rewarded for their workplace contributions, resulting in a shorter time period at the company.
- I also found it surprising that within the departments, R&D had a better female to male ratio (39%:61%) than HR (32%:68%) because R&D roles are typically more technical, therefore, are more often predominantly male.
- In figure 6 below, the average number of companies worked at for those who leave is always higher, regardless of age (after 21 years old) arrange, versus the average number of companies worked at for those stay.

AVG # of Companies Worked	No	Yes
18-21	1.0	1.0

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22-29	1.6	2.4
30-39	2.4	3.1
40-49	3.4	3.6
50+	3.6	4.7
Company AVG	**2.6**	**2.9**

Figure 6

What recommendations would you make to the head of the division to address the risk factors for attrition (20 points)

The underlying goal of this change is to address attrition rate within the organization, therefore, this change process is *tactical* as the scale is incremental and comes from the top-down (T., 2005). I would recommend the Sales head to follow Kotter's 8 Step Model for change (J Kotter, 2015).

1. Setting the climate for change begins by:
    a. *Creating a sense of urgency* done by informing employees regarding executive concern for annual employee retention rate by showcasing the attrition rate for different divisions and highlighting the disproportionately high rate for Sales. This will show awareness and, concern for change.
    b. Ensure upper management understands the risk factors associated with employees leaving or feeling unengaged by *communicating the overall company vision* of decreasing attrition. This will help build a guiding team to guarantee it trickles down to bottom line employees.
    The main resistance currently foreseen is *ideological resistance* where the head believes that regardless of efforts, it won't make a difference (Combe, 2014). The Sales Division in most workplaces typically have a higher attrition rate than other departments so, the Sales head may cite this as a common industry standards (HBR, 2017). It is paramount to provide facts and highlight future value in persuasion techniques. Rationale facts provided can be cost of attrition and training for new head count while, emotional facts will engender intrinsic initiatives to be taken.
2. Engaging the division:
    a. *Communicate buy in* from higher ups such as the CEO and Chief Analytics Officer will showcase the company will dedicate resources to support where needed.
    b. This will ultimately *empower action* from upper management within the division.
    c. *Create short term wins* by setting up reward systems for the team, thereby, making employees feel intrinsically rewarded. One way the division could do this is by celebrating small milestones such as first, fifth, tenth, and twentieth deal closes. This could be done by sharing the win in an email chain, slack channel, or small catered work celebrations for the employees.
3. These changes need to be done through an Analytics Virtuous Cycle as this would ensure benchmarks are in place to drive the vision. Metrics that could be monitored are the frequency of reward systems, job satisfaction survey responses, and performance or

employment data to see if it has made improvement, as well as where it can be sustained over time. (StartSlice, 2013) This will help any change resistance through the diffusion of change by highlight *observed results* and alignment with *company values*.

For one of your recommendations, how would you design a rapid experiment to learn whether your recommendation successfully mitigates attrition? What information beyond employee survey data would you want to track? How would you collect and report the data? (20 points)

The experiment will be conducted through a similar practice as the "Lean StartUp Method" by:

1. Problem Ideation –
   For the experiment, the objective is to understand how the company can improve the overall attrition rate through first applying an experiment for a smaller subset being the Sales Division. Since the change process often begins with empowering upper management to guide the overall cultural values of the workplace, the research question will be "Does more input from upper management influence their subordinates to increase productivity and happiness in the work place?"
2. Developing Minimum Viable Product –
   The MVP in this case will be proposed solutions to validate the research question. For the experiment, the proposed solution will be aimed at increasing cultural workplace support. The first step would be to communicate the issue and objective at hand to everyone, then create a survey with support of the Sales head to understand Sales Representative current struggles. Questions on the survey would identify which issues matter the most, then begin implementing the recommended solutions, and monitoring metrics over time.

Issues in Current Job	Proposed Solution
Not enough resources or training for tasks	Implement *training workshops* after identifying where employees struggle (e.g. database workshop, negotiation workshop, copywriting workshop)
Overwhelmed at work	• Set up pairs in division to distribute workload where necessary • Seek budget for additional headcount (potentially as contract worker for certain period initially)
No vision of career progression	• Career planning workshop • Leadership development training • Set up weekly time for employees to demonstrate skills (workshops employee led where anyone can teach a certain skill to others)

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3. Gathering data for analysis and improvement
   Added metrics evaluated aside from current job performance, and job satisfaction listed above:
   - *Strength of sentiment on problems* measured from 1 – 10 to highlight which areas should be focused on first. Furthermore, open boxes in the survey could allow employees to respond with any further suggestions.
   - *Net Promoter Score* (NPS) is essentially a metric measuring customer experience to promote overall business growth. In this case, "would the employee refer a friend to work here", measured from 1 – 10. (NPS, 2020)
     - Detractors are people who rate from 0 – 6
     - Passives are people who rate 7 – 8
     - Promoters are people who rate 9 – 10
       - NPS calculation = % Promoters - % Detractors

     While attrition is measured on an annual basis, this could be a way to understand if employees would want a friend to experience their work place environment.
   - *Sales metrics for each employee*:
     - Sales target measured by number of accounts maintained, or products/services sold.
     - Opportunities open by evaluating likelihood for deal closure and, where in the overall sales cycle employees are (e.g. lead, negotiation, or close).
     - Lead conversion rate is measured from how many total qualified leads turn into deals closed.
     - Average commission value measured by the average revenue from commission an employee receives based on total number of sales closed.
     - Accounts managed per sales representatives.
     - Financial information such as sales revenue and expenses.

Since the objective is to decrease attrition rate in the company, the NPS should be closely monitored because although headcount is a crucial metric to track, the NPS will allow management to review performance, and happiness of an employee's workplace experience before it leads to leaving the company. Furthermore, tangible Sales KPIs will indicate if the productivity of the division has increased by improving workplace morale and support. The survey measuring the added metrics, job performance, and satisfaction should be collected anonymously from Sales upper management, while the Sales Division metric can be collected from integrating the Sales Database. Both should be analyzed on a monthly basis.

Weekly team meetings should be set up among the division to communicate the objective and progress of the experiment. The key metrics particularly the NPS, average sentiment on issues, average job performance ratings, average job satisfaction ratings, and average commission value by job roles should be reported at the beginning of the month to highlight any

improvements or opportunities to bridge. Showcasing changes over short periods of time will hopefully demonstrate wins within the division. Setting milestones for the key metrics that the company aspires to reach (e.g. desired average job satisfaction rating) will ensure a benchmark is in place to measure success of the experiment. This will in turn set up the virtuous cycle needed to regularly monitor the company goals in hopes of consolidating cultural values in the workplace. (StartSlice, 2013)

Works Cited

Combe. (2014). Retrieved from Change Readiness: Focusing Change Management Where It Counts: https://www.pmi.org/learning/library/change-readiness-11126

HBR. (2017). Retrieved from How to Predict Turn Over on Your Sales Team: https://hbr.org/2017/07/how-to-predict-turnover-on-your-sales-team#:~:text=Companies%20worry%20about%20employee%20attrition,is%20less%20than%20two%20years.

Information Week. (2020). *What's Driving the Tech Sector's Extreme Turnover*. Retrieved from https://www.informationweek.com/strategic-cio/team-building-and-staffing/whats-driving-the-tech-sectors-extreme-turnover-rate/a/d-id/1334920?#:~:text=Today%2C%20tech%20has%20the%20highest,business%2C%20no%20matter%20the%20size.

J Kotter. (2015). *Leading Change: Why Transformation Efforts FailLinks to an external site.* Retrieved from Harvard Business Review: https://clio.columbia.edu/catalog/4813595

NPS. (2020). Retrieved from https://www.netpromoter.com/know/

Qualtrics. (2020). *Determine Sample Size*. Retrieved from https://www.qualtrics.com/experience-management/research/determine-sample-size/

StartSlice. (2013). Retrieved from Developing a Business Analytics Roadmap: http://www.statslice.com/wp-content/uploads/2013/03/Analytics-Roadmap-White-Paper-Final-Formatted.pdf

T., R. (2005). *Organisational change management.* Journal of Change Management.

Appendix

	HR	R&D	Sales
Number of Roles	2	6	3
Managerial Roles	1	3	1
Job Level			
1	52%	45%	17%
2	21%	29%	54%
3	10%	13%	19%
4	6%	7%	8%
5	11%	5%	3%

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Job Involvement			
1 'Low'	5%	5%	7%
2 'Medium'	27%	26%	25%
3 'High'	57%	58%	61%
4 'Very High'	11%	11%	8%
OverTime Ratio (N:Y)	73:27	72:28	71:29
Number of Years at Company			
0-1	5	149	61
2-5	31	371	159
6-10	18	286	144
11-15	2	65	41
16-20	2	50	20
21-25	3	25	13
26+	2	15	8
AVG Years at Company	7.24	6.86	7.28
Years in Current Role			
0-1	12	205	84
2-5	33	426	188
6-10	18	277	149
11+		53	25
AVG Years at Curr Role	3.54	4.16	4.49
0-1	13	223	103
2-5	31	407	177
6-10	19	284	140
11+		47	26
AVG Years w CurManager	3.67	4.08	4.27
Years Since Last Promo			
0-1	41	622	275
2-5	17	205	95
6-10	4	91	54
11+	1	43	22
AVG Years Since Last Promo	1.78	2.14	2.35
Stock Option Level			
0	27	407	197
1	28	393	175
2	3	103	52
3	5	58	22
Job Satisfaction			
1	11	192	86
2	20	174	86

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3	15	300	127
4	17	295	147
AVG Job Satisfaction	2.6	2.7	2.8
Environment Satisfaction			
1	11	187	86
2	12	177	98
3	26	292	135
4	14	305	127
AVG Environment Satisfaction	2.68	2.74	2.68
Relationship Satisfaction			
1	8	173	95
2	11	212	80
3	24	298	137
4	20	278	134
AVG Relationship Satisfaction	2.89	2.71	2.7
Work Life Balance			
1	4	60	16
2	7	235	102
3	42	575	276
4	10	91	52
AVG Work Life Balance	2.92	2.73	2.82
Performance Rating			
3	54	805	385
4	9	156	61
AVG Performance Rating	3.14	3.16	3.14