



Sample analysis: factor analysis and t tests

Background

A company director knows that members of staff are more productive and effective if they have high levels of job satisfaction. In order to find out levels of job satisfaction and to identify possible areas that could be improved, a questionnaire is given to the 250 employees. A twelve item questionnaire was used with each question rated from 1 (not satisfied) to 5 (very satisfied). The twelve items were:

1. My responsibilities are clearly defined
2. I feel that I can work with a high degree of independence
3. I feel that my career is developing well within the company
4. I have been offered useful professional development training
5. My achievements are noticed and rewarded
6. I socialise with my work colleagues
7. I have a clear view of the aims of the company
8. I have a good work-life balance
9. I feel that I can approach my line manager if I have questions
10. There is collaboration between colleagues
11. I receive support from my line manager
12. Overall, I am satisfied with my job

Analyses conducted

The data were analysed in three stages:

1. Descriptive statistics to summarise staff responses to each item on the questionnaire
2. Factor analysis. There are a number of items on the questionnaire and it is quite likely that some of the questions measure the same underlying aspect of staff satisfaction. Factor analysis looks at the relationships between the items on the questionnaire. Items that receive very similar responses are then grouped together to form a smaller number of “factors”. Each factor represents one independent aspect of job satisfaction, which might be made from a number of items from the questionnaire.
3. Analysis of factor scores. Once we have reduced the twelve questionnaire items into a smaller number of factors, we can then calculate a “factor score” for each staff member that summarises how they feel about that factor aspect of job satisfaction. These factor scores can

then be further analysed, for example, by comparing factor scores for full time and part time members of staff.

Results: Descriptive statistics

		Mean	SD	Min.	Max.
1	My responsibilities are clearly defined	2.9	0.7	1	5
2	I feel that I can work with a high degree of independence	2.9	0.8	1	5
3	I feel that my career is developing well within the company	4.0	0.7	2	5
4	I have been offered useful professional development training	3.9	0.7	3	5
5	My achievements are noticed and rewarded	3.1	0.6	1	5
6	I socialise with my work colleagues	4.1	0.7	3	5
7	I have a clear view of the aims of the company	4.1	0.7	3	5
8	I have a good work-life balance	4.0	0.6	2	5
9	I feel that I can approach my line manager if I have questions	3.1	0.8	1	5
10	There is collaboration between colleagues	3.1	0.7	1	5
11	I receive support from my line manager	3.5	0.8	1	5
12	Overall, I am satisfied with my job	3.2	0.8	1	5

When interpreting the descriptive statistics, it is important to remember that the scale for responding ranged from 1 to 5. This means that a “neutral” response would have a mean of 2.5. For all of the items on the questionnaire the mean rating was above 2.5, indicating that overall the staff feel positively about their job satisfaction.

Most of the items had the full range of scores, from 1 to 5. This means that, although overall people feel positively about their job satisfaction, some people do have negative feelings. However, there are some items (4, 6, and 7) where the lowest score was 3, which is above a neutral response. This means that every member of staff has positive feelings regarding training, socialisation and having a clear view of the company aims.

Results: Factor analysis

The factor analysis showed three underlying aspects of job satisfaction represented within the twelve items included in the questionnaire. For each factor, we need to interpret three things:

1. What does the factor represent? This is worked out by looking for common themes in the items contained within a factor. It can be seen as a unique aspect of job satisfaction.
2. How much of the variability in job satisfaction does the factor explain? Job satisfaction is likely to comprise a wide range of aspects, some of which will be more important than others. The more variability that a factor explains, the more important it is.
3. Which items contribute to a factor and how much? In the table below the items have been divided up according to which factor they represent. The table also shows a score called a “factor loading”. Items with higher factor loadings are more representative of that factor.

	Factor One	Factor Two	Factor Three
I receive support from my line manager	.759		
Overall, I am satisfied with my job	.740		
My responsibilities are clearly defined	.720		
I feel that I can approach my line manager if I have questions	.696		
I feel that I can work with a high degree of independence	.680		
There is collaboration between colleagues	.655		
My achievements are noticed and rewarded	.634		
I have a clear view of the aims of the company	.596		
I have been offered useful professional development training		.754	
I feel that my career is developing well within the company		.694	
I have a good work-life balance			.728
I socialise with my work colleagues			.717

Factor One:

- Includes 8 items that represent *satisfaction with the overall working environment*.
- Satisfaction with the working environment explains 32% of the variability in job satisfaction.
- Support received from their line manager is the item that is most representative of satisfaction with the overall working environment, whereas having a clear view of the company aims is the least representative item.

Factor Two:

- Includes 2 items that represent *satisfaction with career development*.
- Satisfaction with career development explains 10% of the variability in job satisfaction.
- Being offered useful professional training is the most important aspect of satisfaction with career development.

Factor Three:

- Includes 2 items that represent *satisfaction with social implications of the job*.
- Satisfaction with social implications explains 10% of the variability in job satisfaction.
- Having a good work-life balance is the most important aspect of satisfaction with social implications of the job.

Other relevant information:

- All of the items included in the questionnaire were included in a factor.
- Overall, the three factors extracted from the questionnaire explain 52% of the variability in job satisfaction. This means that there are other aspects of job satisfaction that were not examined in this study that would be important to fully explain job satisfaction

Summary:

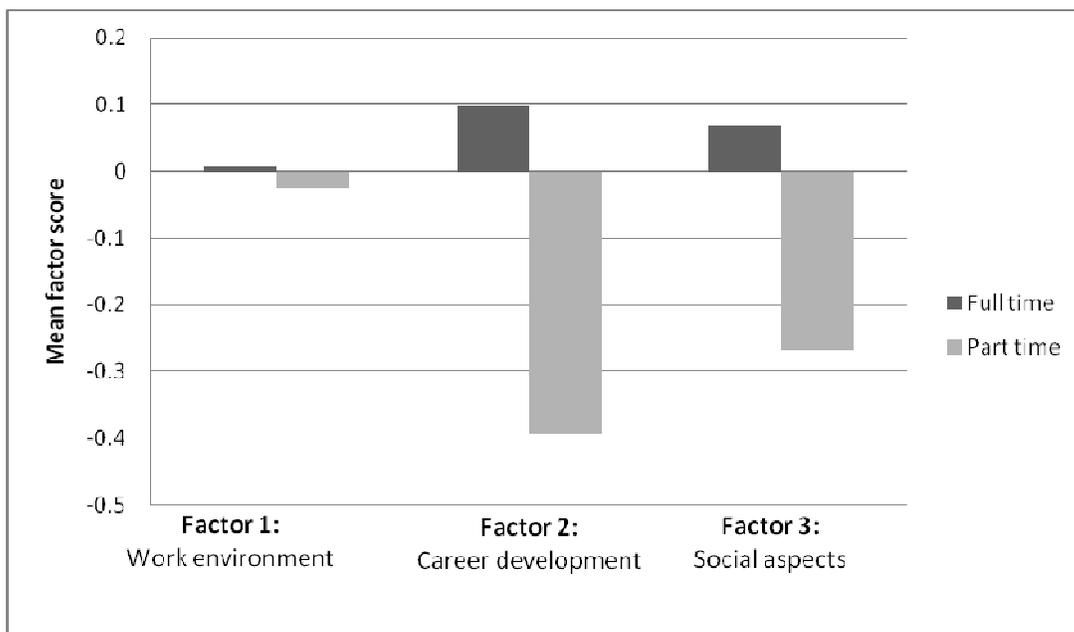
- This questionnaire found three aspects to job satisfaction. Satisfaction with the overall working environment was clearly the most important component. Satisfaction with career development and the social implications of the job were also important.

Results: Analysis of factor scores

Having identified these three important and independent components of job satisfaction, it is possible to calculate an overall “factor score” for each member of staff that summaries how satisfied they are with each aspect of job satisfaction. Rather than each member of staff having 12 scores, one from each item, they will now have 3 scores, one for each factor.

Factor scores have a mean of 0. Scores above 0 (positive values) show that a member of staff is satisfied with that aspect of job satisfaction. Scores below 0 (negative values) show that a member of staff is not satisfied with that aspect of job satisfaction.

Analyses (independent t tests) were conducted to see whether part time (N = 50) and full time (N = 200) members of staff differ in their job satisfaction across the three job satisfaction factors.



- *Work environment*: There was no significant difference in job satisfaction with the work environment between part time and full time members of staff ($t(248) = 0.2, p = .845$).
- *Career development*: There was a significant difference in job satisfaction with career development between full time and part time members of staff ($t(248) = 3.2, p = .002$). Full time members of staff were more satisfied with their career development (mean = 0.1, SD = 1.0) than part time members of staff (mean = -0.4, SD = 1.2).
- *Social aspects*: There was a significant difference in the social aspects of job satisfaction between full time and part time members of staff ($t(248) = 2.1, p = .034$). Full time members of staff were more satisfied with their career development (mean = 0.1, SD = 1.0) than part time members of staff (mean = -0.3, SD = 0.9).

Summary:

- Part time employees feel that their career development and the social aspects of their job are less satisfactory than full time employees. There is no difference in satisfaction with the work environment between full time and part time

Possible issues to consider on the basis of these analyses:

- Overall, responses to the survey indicated that staff members tend to feel positively about their job satisfaction. Some items did receive slightly lower scores (items 1, 2, 5, 9 and 10). If changes were to be introduced, changes that would impact on these aspects should be considered.
- The factor analysis identified three independent aspects of job satisfaction
 - o Satisfaction with work environment
 - o Satisfaction with career development
 - o Satisfaction with social aspects of the job
- Satisfaction with the work environment is the most important component of job satisfaction. This should be recognised in any changes implemented to improve job satisfaction.
- Satisfaction with career development and social aspects are also significant components of job satisfaction. However, there are likely to be other areas of job satisfaction that were not addressed in the questionnaire. Identifying these additional component would help to further improve job satisfaction. Focus groups might be used to identify these additional components.
- There was no difference between full and part time members of staff in terms of satisfaction with the work environment. However, part time members of staff felt less satisfied with their career development and the social aspects of their job.
 - o Career development: Do part time members of staff receive the same training and amount of training as full time members of staff? Might part time members of staff need a different form of training to full time members of staff?
 - o Social aspects: Why do part time members of staff feel less satisfied with the social aspects of their job? Are they less involved? Consider more explicitly involving part time members of staff in any social events that are arranged.