



Balancing Human and Automation Levels for the Manufacturing Workplaces of the Future

Evaluation of job satisfaction: a psychological approach

ACE Cluster webinar, 14/11/2018

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- § Definition of a theoretical framework for promoting workers' satisfaction and organisational performance, on the basis of existing approaches in ergonomics
 - § Description of current approaches to job satisfaction evaluation
 - § Establishment of concrete measures of this satisfaction and performance
- § Application of these measures in MANUWORK use cases

§ Approach

§ Analysis of theoretical frameworks and approaches (SOA)

§ Definitions of workers' / employees' / job satisfaction

§ Psychological or psychosocial theories behind the definitions

§ Factors covered by a given approach



§ Definitions of job / workers' satisfaction

- § One of the most researched variables in workplace psychology (Lu et al., 2012)
 - § Numerous definitions covering:
 - § the affective feeling an employee has towards their job or specific aspects of it (e.g. colleagues, pay or working conditions)
 - § the extent to which work outcomes meet or exceed expectations
 - § More recently: a multidimensional psychological concept with cognitive (evaluative), affective (or emotional), and behavioral components (Hulin & Judge, 2003).
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- Lu, H., Barriball, K. L., Zhang, X. & While, A.E.. 'Job satisfaction among hospital nurses revisited: A systematic review', *International Journal of Nursing Studies*, 49, 2012, pp. 10-17.
 - Hulin, C. L., & Judge, T. A. (2003). *Job attitudes*. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Handbook of psychology: Industrial and organizational psychology* (pp. 255-276). Hoboken, NJ: Wiley.

§ Theories behind the concept of job / workers' satisfaction

§ Range of Affect Theory (Locke, 1976): the most famous one

§ Satisfaction is determined by a discrepancy between what one wants in a job and what one has in a job.

§ Dispositional approach (Staw, 2005)

§ Individuals vary in their tendency to be satisfied with their jobs, i.e. job satisfaction is to some extent an individual trait

- Locke, E. A. (1976). *The nature and causes of job satisfaction*. In M. D. Dunnette (Ed.), *Handbook of industrial and organizational psychology* (pp. 1297–1349). Chicago: Rand McNally
- Staw, B. M.; Cohen-Charash, Y. (2005). "The dispositional approach to job satisfaction: More than a mirage, but not yet an oasis: Comment". *Journal of Organizational Behavior*. 26 (1): 59–78

Evaluating Worker Satisfaction

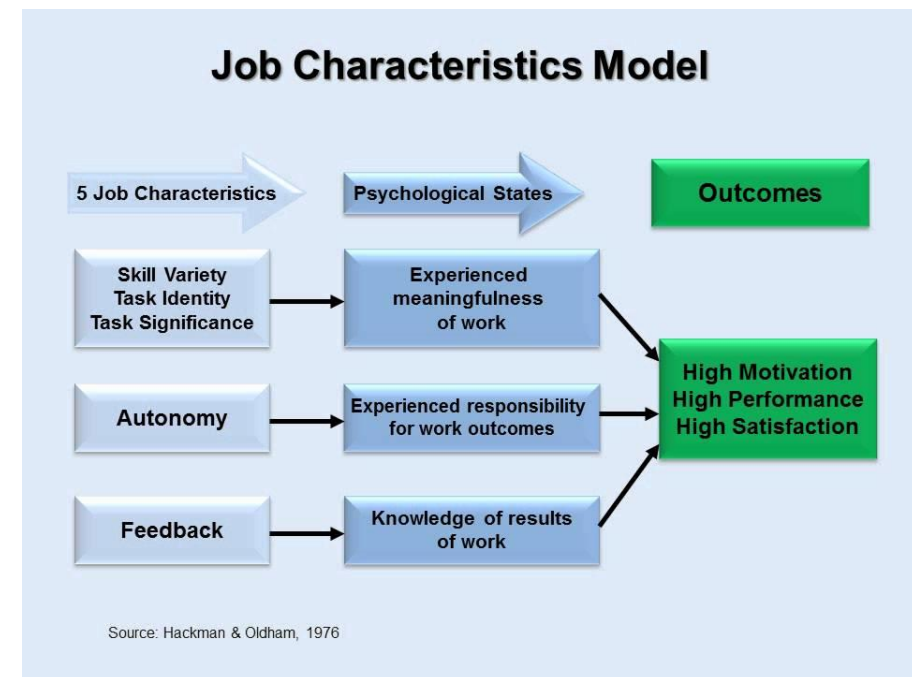
§ Theories behind the concept of job / workers' satisfaction

§ Job Characteristics Model (Hackman & Oldham, 1975)

§ Main premise:

§ Job satisfaction occurs when the work environment encourages intrinsically motivating characteristics.

§ Five key job characteristics (skill variety, task identity, task significance, autonomy and feedback) influence three psychological states



- Hackman, J.R., & Oldham, G.R., 'Development of the Job Diagnostic Survey', *Journal of Applied Psychology*, 60, 1975, pp. 161.

Psychosocial characteristics & job satisfaction



- § Analysis based on 13 psychometric and socio-organizational factors, which are important for workers' satisfaction and productivity (D3.3, submitted in M24)
 - § Psychological support
 - § Organizational culture oriented to trust and honesty
 - § Clear leadership and expectations
 - § Civility and respect
 - § Psychological competencies and requirements
 - § Growth and development
 - § Recognition and reward
 - § Involvement and influence
 - § Workload management
 - § Balance
 - § Psychological protection
 - § Protection of physical safety



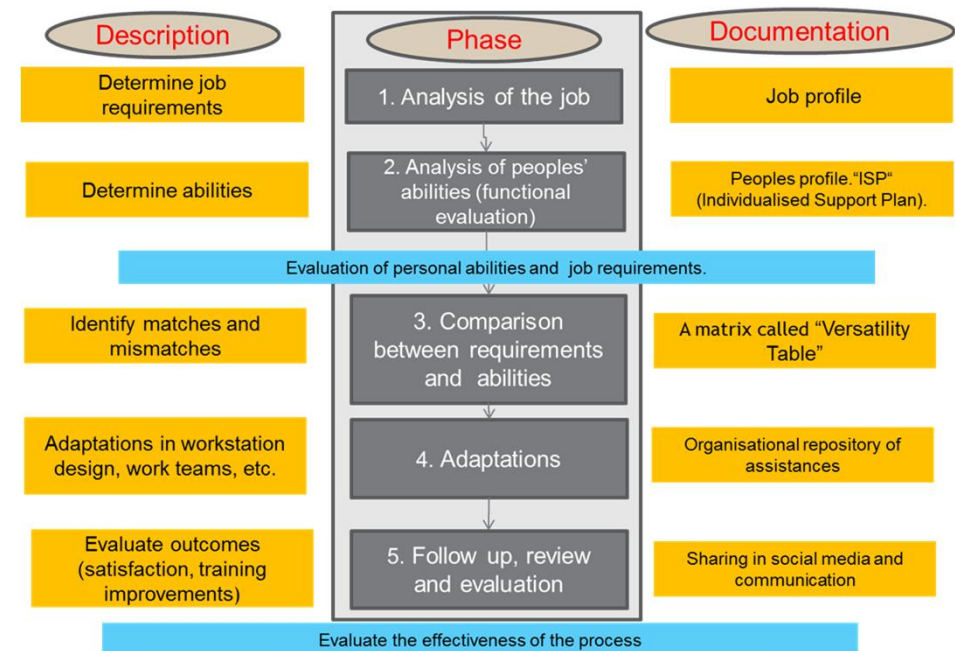
§ Methodology: one visit to Lantegi, a number of discussions with Lantegi ergonomists and a theoretical analysis of the Profiling method

§ Major results:

§ Very structured, exemplary approach to all psychosocial factors and job satisfaction evaluation

§ The results on workers' satisfaction and performance are remarkable.

§ Employees are generally satisfied with their work conditions, feel engaged with the organizational goals and motivated to achieve them



- § Methodology: several visits to Safran, a number of discussions with the MANUWORK project manager there and 13 semi-directed interviews with operators and line managers
- § Major results:
 - § In Safran, there is a less structured approach to work organization and job satisfaction evaluation than in Lantegi.
 - § However, the operators express general satisfaction with their working conditions as their work asks for particular competences, for which they are recognized and estimated + working for a world leader
 - § More efforts could be done to improve the communication with higher hierarchical levels

- § Methodology: several visits to Volvo done by the University of Skövde. Interviews with operators and supervisors were done during these visits
- § Major results:
 - § A focus on work-related factors affecting job satisfaction.
 - § A lot effort is put in introducing automation, which limits or almost eliminates the lifting of heavy loads.
 - § Also, work-life balance is taken into account and no particular complaints are expressed about this.
 - § In general, the interviewees were highly satisfied with their jobs and with the idea of working in a highly technological company.
 - § A possible point of improvement was the management of the uncertainty as far as the operation of the automation is concerned.



The most common and cost-effective way of measurement (chosen also for MANUWORK)

- Use of rating scales where employees report their reactions to their jobs
- Questions relate to rate of pay, work responsibilities, variety of tasks, promotional opportunities the work itself and co-workers
- Examples:
 - yes/no questions
 - Rank satisfaction on 1-5 scale (where 1 represents “not at all satisfied” and 5 represents “extremely satisfied”)

Validity of the instruments

29 instruments (questionnaires) analysed: only 7 met the criteria of validity and reliability

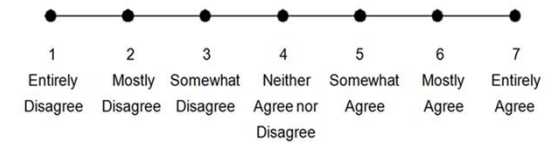
Name	Items	Answer scale	Factors assessed
Job in General Scale	18 items	Three answer categories (yes, ?, no)	General job satisfaction
Andrew and Withney Job Satisfaction Questionnaire	Five items	Seven-point Likert scale (from 1 - delighted to 7 - not at all satisfied)	General job satisfaction
Job Satisfaction Survey	Multidimensional instrument (nine subheadings, unknown number of items)	Six-point Likert scale (from 1 - disagree to 6 - agree very much)	Salary, promotion, supervision, fringe benefits, contingent rewards, operating procedures, co-workers, work and communication
Emergency Physician Job Satisfaction Scale	79 item multidimensional instrument	Seven-point Likert scale (from -3 - strongly disagree to 3 - strongly agree)	General job satisfaction and administrative autonomy, clinical autonomy, resources, social relationships, lifestyle and challenges
McClosky/Mueller Satisfaction Scale	31 item multidimensional instrument	Five-point Likert scale (from 1 - very dissatisfied to 5 - very satisfied)	Extrinsic rewards, scheduling satisfaction, work-life balance, co-workers, interaction, professional opportunities, praise/recognition and control/responsibility
Measure of Job Satisfaction	38 item multidimensional instrument	Five-point Likert scale (from 1 - very dissatisfied to 5 - very satisfied)	Personnel satisfaction, workload, professional support, salary, and prospects and training
Nurse Satisfaction Scale	24 item multidimensional scale	Seven-point Likert scale (from 1 - strongly agree to 7 - strongly disagree)	Administration, co-workers, career, patient care, relations with supervisor, nursing education and communication

Van Saane, N., Sluiter, J.K., Verbeek, J.H.A.M. & Frings-Dresen, M.H.W., 'Reliability and validity of instruments measuring job satisfaction: a systematic review', *Occupational Medicine*, 53, 2003, pp. 191.



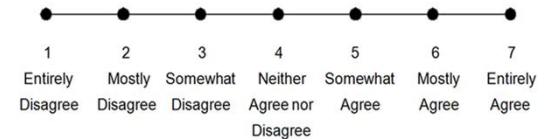
- § Review of valid and reliable instruments
- § Choice of instruments which have proven their validity in a variety of work contexts (rather than in specific ones)
 - § Job in General scale (long and short versions)
 - § Andrews and Withey Job Satisfaction Questionnaire
 - § A single item questionnaire
- § Instruments sent to Safran and Volvo with a expert evaluation scale
- § Discussed in a number of telcos and brainstormings with Lantegi

1. The job characteristics (items) as formulated in this questionnaire are suitable for analysing job satisfaction in our work context:



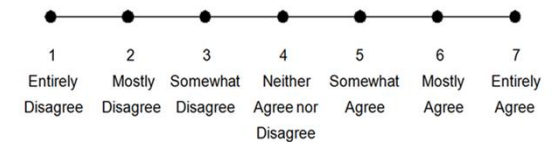
- If answers from 1 to 3, please give a short explanations which items are not suitable and why.

2. The answers (adjectives) as formulated in this questionnaire are suitable for analysing job satisfaction in our work context:



- If answers from 1 to 3, please give a short explanations which items are not suitable and why.

3. In our work context, the application of this questionnaire will be of great benefit for management:



- § The Abridged Job in General Scale judged adapted for an application in Safran
- § No further modifications were proposed for this instrument
- § Currently, its possible application during the pilot are discussed (before, during and after the introduction of MANUWORK technologies)
- § If applied, the approach will focus on job satisfaction in relation with MANUWORK technologies and not necessarily to orient operators to aspects which cannot be modified during the project or by the project team.

People on Your Present Job

Think of the majority of people with whom you work or meet in connection with your work. How well does each of the following words or phrases describe these people? In the blank beside each word or phrase below, write

Y for "Yes" if it describes the people with whom you work
N for "No" if it does not describe them
? for "?" if you cannot decide

.....

- Stimulating
- Boring
- Slow
- Helpful
- Stupid
- Responsible
- Likeable
- Intelligent
- Easy to make enemies
- Rude
- Smart
- Lazy
- Unpleasant
- Supportive
- Active
- Narrow interests
- Frustrating
- Stubborn

Job in General

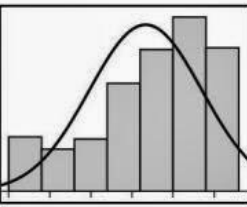
Think of your job in general. All in all, what is it like most of the time? In the blank beside each word or phrase below, write

Y for "Yes" if it describes your job
N for "No" if it does not describe it
? for "?" if you cannot decide

.....

- Pleasant
- Bad
- Great
- Waste of time
- Good
- Undesirable
- Worthwhile
- Worse than most
- Acceptable
- Superior
- Better than most
- Disagreeable
- Makes me content
- Inadequate
- Excellent
- Rotten
- Enjoyable
- Poor

**THE
JOB DESCRIPTIVE
INDEX**



2009 Revision

including
The Job in General Scale

BGSU[®]
Bowling Green State University

The Job Descriptive Index
© Bowling Green State University
1975-2009

The Job In General Scale
© Bowling Green State University
1982-2009

Expert evaluation of instruments: major results



§ The Andrews and Withey Job Satisfaction Questionnaire was judged:

- § With items and scales suitable for the Volvo work context
 - § Small modifications suggestions
 - § With clear benefits for management, workers and unions, as the answers may be used to continuously improve the workplace.
 - § Long term trends can also be used to see if changes in the workplace affect the workers.
 - § Not particularly time consuming to administer
 - § => Modified instrument + attitudes to robots
- ## § Possible applications of the questionnaire + questionnaire on attitudes to robots (to still be adapted) is currently discussed
- ## § Focus on MANUWORK technologies + Ergonomics

1. How do you feel about your job?

7	6	5	4	3	2	1
Delighted	Pleased	Mostly satisfied	Mixed	Mostly dissatisfied	Unhappy	Terrible

2. How do you feel about the people you work with – your co-workers?

7	6	5	4	3	2	1
Delighted	Pleased	Mostly satisfied	Mixed	Mostly dissatisfied	Unhappy	Terrible

3. How do you feel about the work you do on your job – the work itself?

7	6	5	4	3	2	1
Delighted	Pleased	Mostly satisfied	Mixed	Mostly dissatisfied	Unhappy	Terrible

4. What is it like where you work, namely the physical surroundings?

7	6	5	4	3	2	1
Delighted	Pleased	Mostly satisfied	Mixed	Mostly dissatisfied	Unhappy	Terrible

5. What is it like where you work, namely the hours of work?

7	6	5	4	3	2	1
Delighted	Pleased	Mostly satisfied	Mixed	Mostly dissatisfied	Unhappy	Terrible

6. What is it like where you work, namely the amount of work you are asked to do?

7	6	5	4	3	2	1
Delighted	Pleased	Mostly satisfied	Mixed	Mostly dissatisfied	Unhappy	Terrible

7. How do you feel about the equipment you have for doing your job?

7	6	5	4	3	2	1
Delighted	Pleased	Mostly satisfied	Mixed	Mostly dissatisfied	Unhappy	Terrible

8. How do you feel about the information you have for doing your job?



Expert evaluation of instruments: major results








- The items of the existing instruments were judged, in general, suitable. However,
 - for the Job in General Scale (both versions): salary not suitable
 - For all the standardized instruments, aspects related to stress, aging and isolation were lacking.
 - All the standardized instruments were judged too complex to be applied directly. A simplification of the language and the response options seemed necessary.
 - The 7-likert scale was judged too long. A 3 to 5-point Likert scale was proposed.
 - For the attitudes to robots questionnaire, a scenario-based presentation of MANUWORK technologies seemed necessary.
 - => New instrument, 14 questions
 - A test of the instrument with operators + attitudes to robots is currently discussed








Expert evaluation of instruments: major results






1. Do you like your job?

				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>






2. How do you feel about your colleagues?

				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>






1. How do you find your work conditions, namely the light at your workplace?

				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>






2. How do you find your work conditions, namely the temperature?

				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>






3. How do you find your work conditions, namely the noise?

				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>






4. How do you find the hours of work?

				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>






5. How do you feel about the amount of work you are asked to do?

				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>






1. Do you find your work stressful?

				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. Do you need help for doing your work?

				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Do you sometimes feel isolated at work?

				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

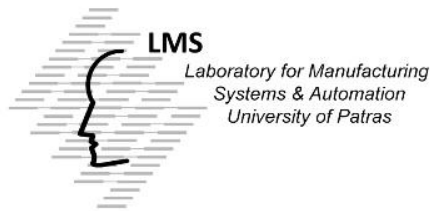
- My interaction with a robot would be clear and understandable (1 – 7)
- I would find a robot useful in the workplace
- Using a robot would enhance my effectiveness in the workplace
- Using a robot in the workplace would increase my productivity
- Using a robot would make my job easier
- Using a robot would improve the workplace
- Using a robot in the workplace would enable me to accomplish tasks more quickly
- I would find a robot easy to use
- I would find a robot to be flexible for me to interact with + 4 more questions

- Data collection through ISN
- Data analysis in Data Analytics module
- Data use by SKIMATIC



Thank you!

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