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Determining the main variables to measure human risk in organizations: A quantitative survey conducted in Switzerland

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Abstract: Research on questionnaires to measure variables related to work experience is abundant. However, these questionnaires are mainly used for scientific validation purposes. In this paper, we aim to create a human risk questionnaire, although grounded on the scientific literature, containing solely a limited number of questions to measure on a regular basis a single human risk score within an organization. We present recent results based on different statistical tests (e.g. ANOVA, CHI-SQUARE and linear regression) of a quantitative survey aimed at finding out which dimensions work best for assessing Job Satisfaction and Pride. Findings are in line with the scientific literature and show first that Job Satisfaction and Pride are both strongly linked to Hierarchical Position. Second, Job Satisfaction is essentially linked to recognition and meaning at work, management attention to employee well-being. Third, Job Pride is essentially linked to the meaning employees find in work activities.

Introduction: Human workplace risk can be addressed as a business management risk and not only as a medical problem. At the European level, initiatives call for a more restrictive legal framework in order to ensure a high quality environment for workers. Companies cannot efficiently fight a toxic environment and its detrimental impact if they do not have the tools to monitor and manage human-related risks. According to Enterprise Risk Management (ERM), risk is what prevents the achievement of a business objective. The most famous ERM standards are COSO ERM and ISO 31000 and include all kinds of risk categories. However, no category specifically focuses on human risk as a business risk.

Objectives: The purpose of this research is to use proven scientific knowledge to create a regular, fast and ergonomic bottom-up data collection system to compute an overall human risk score for companies. Indeed, for companies, what really matters are the stress or dissatisfaction, or any other factors that lead to harmful behaviour that prevent managers and their teams from achieving their objectives. The collection system will be designed and marketed as a software module to be incorporated into an enterprise risk management solution.

It will collect and analyze the relevant data to calculate a single score measuring the level of human risk early enough to manage it before it may lead to meaningful damages. As we aim to develop a tool enabling to identify and mitigate human-related risks, the main research question to be answered is: “How to build an organization’s checkup tool for human risks?” Necessary data will be collected on a frequent and regular basis in the risk register, and a single score will be calculated for each business unit of a given company.

Theory: Based on reference questionnaires from the scientific literature, originally developed to measure attitudes and feelings about our work, we have inventoried and retained 171 relevant questions (e.g. Leiter & Maslach, 1999; Morgeson & Humphrey, 2006; Cohen et al., 1983; Diener et al., 1985, Schaufeli et al., 2006). Using a nominal group method, the 171 questions were clustered into the 15 following topics: (1) planning / organization, (2) decisions / initiatives, (3) variety of tasks, (4) meaning / importance of the work, (5) creativity / complexity, (6) socialization / support, (7)

hierarchy support, (8) external relations / customers, (9) material resources, (10) workload, (11) justice, (12) sense of security, (13) feeling satisfied vs uncomfortable, (14) self-confidence / competence, (15) recognition / reward. Then, each topic has been measured through a statement. For instance, for topic 1 (Planning / organization), respondents assessed their attitude towards this topic by the statement "I am dissatisfied with the organization that has been given to me on the work I do" (it was answered based on the following 5-point Likert scale: "Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree"). In this short paper, we briefly present three reference models related to work experience: demand-autonomy (Theorell & Karasek, 1996), effort-reward imbalance (Siegrist et al., 1986) and Maslach burnout inventory (Maslach & Jackson, 1981). All these models are at the origin of questionnaires often used to conduct field studies related work experience.

In Karasek's model (Theorell & Karasek, 1996), also known as the demand-autonomy model, a work context characterized by a combination of low decision-making autonomy and high psychological demand is assumed to increase the risk of developing a physical or mental health problem. More precisely, the psychological demand is the amount of work to be done, the time constraints related to this work and the mental demands. Decision-making autonomy refers to the worker's ability to have control over the tasks the employee must perform but also over the possibility of developing his/her skills.

Future research has added social support as a third component of the model. In general, it reflects the interactions experienced at work, with colleagues and the hierarchy. Social support therefore intervenes, when it is present, as a modulator of tension at work. In other words, in case of difficulty, social support can help the person by making them feel supported, or on the contrary, it may aggravate the situation with a feeling of abandonment by their colleagues/leaders.

Siegrist's model (Siegrist et al., 1986), also known as the effort-reward imbalance model, is based on the hypothesis that a combination of high effort and low rewards will allow pathological reactions to occur, both physiologically and emotionally. The high effort variable can come from two sources: external and internal. External origin includes high demands at work such as having a lot of responsibility or being often interrupted.

Otherwise, it may be an intrinsic effort that translates attitudes into motivations for excessive engagement in work. With regard to the latter aspect, a sense of duty, a need to surpass oneself or the self-gratifying experience of facing challenges or controlling a situation can be explained. If low rewards such as unsatisfactory pay, lack of esteem and respect at work and low job security are present in conjunction with high effort, then the person may be faced with a risky situation.

Burnout in the BMI (Maslach Burnout Inventory) model inventory (Maslach & Jackson, 1981) is defined as a psychological syndrome of exhaustion, cynicism and ineffectiveness, experienced in response to chronic stressors. Engagement (versus burnout) as proposed by this model inventory (Maslach & Jackson, 1981) is a different construct from others typically proposed by organizational psychology such as organizational commitment, job satisfaction or job invasion.

Organizational commitment refers to the employee's allegiance to the organization that gives him/her work. The focus is on the organization, while the commitment focuses on the work itself. Job satisfaction is the extension of the idea of work as a source of the need for achievement and satisfaction, but does not include the person's relationship with the work itself. Organizational

involvement is similar to the concept of involvement contained in engagement with work, but does not include the dimensions of energy and efficiency. Therefore, engagement provides a more complex and in-depth perspective of an individual's relationship.

Methods: We have conducted a quantitative survey to validate our primary assumptions based on the scientific literature. The questionnaire was administered in the service sector of the French-speaking region of Switzerland from March to Mai 2019. The sample size is 893 (1191 questionnaires collected, non-valid were excluded). Then different statistical tests (e.g. ANOVA, CHI-SQUARE and linear regression) were systematically conducted for each of the possible pairs of variables measured by the questionnaire.

Results: We measured the general attitude of employees towards their work according to two general questions. We focus in this paper on these two questions (Q1 and Q2) measured on 5-level scale :

Q1: Overall, how would you rate your job satisfaction?

Q2: Overall, are you proud of your work?

In this section, we solely highlight a few statistical tests. Table 1 indicates the overall results for both Q1 and Q2.

	Q1	Q2
Mean	4.00	4.37

Table 1. Number of answers for Q1 and Q2 and related average score

ANOVA Satisfaction vs. hierarchical level

Significant ANOVA. Effect of hierarchical level on satisfaction, $F(2,820) = 13.7$; $p < 0.001$. The effect size is between low and medium ($n^2 = 0.032$). A more detailed analysis shows that the observed differences exist between the executive and senior management levels, and between the executive and employee levels. It would appear that the senior manager has a higher level of satisfaction than managers and employees.

ANOVA pride of work vs. hierarchical level

Significant ANOVA. Effect of hierarchical level on pride, $F(2.757) = 3.72$; $p < 0.05$. The effect size = 0.010. If we analyse in more detail, we notice that the only difference observed is between the senior management level and the employee. It would appear that the senior manager is more proud of his or her work than an employee. However, this effect is small ($n^2 = 0.010$). The size of the "senior executive" group may be a reason.

Influence of the hierarchical level according to sex

The test is significant (Chi-square = 68.1 ; $p <.001$). Sex seems to be related to the position held in the company. Women are under-represented in our sample in high hierarchical positions (see Table 2).

Contingency Tables

	Hierarchical Le.			
Sex	Manag.	Excec.	Employee	Total
Woman	45	13	378	436
Man	101	46	240	387
Total	146	59	618	823

X^2 Tests

	Value	df	p
	681	2	<.001
	823		

Table 2. Chi-square test regarding sex and hierarchical level

Each of the 15 topics was measured over a Likert scale containing 5 items (“Strongly Agree: 5, Agree:4, Neutral: 3, Disagree: 2, Strongly Disagree:1”). We used multiple regression procedures on questions 1 and 2 on the one hand, and with the 15 themes on the other..

Regression model with Job Satisfaction (Q1) as the dependent variable

To avoid problems of collinearity between variables we used a multiple linear regression instead of the correlation coefficient. Our model tells us that 45% of the variance in Job Satisfaction is explained by 7 of the 15 different topics. The factors that carry the most weight (see Table 3) are recognition in work (b =.24; p <.001), the meaning found in work (b =.22; p <.001) and management's attention to employee well-being (b =.19; p <.001).

Model Fit Measures

Model	R	
	0.671	0.450

Model Coefficients

Predictor	Estimate	SE		p
Intercept	0.253	0.1679	1.51	0.132
Q3.5_Satisf_Workload	0.172	0.0383	4.49	<.001
Q3.8_Satisf_Recog	0.240	0.0373	6.45	<.001
Q3.7_Satisf_Meaning	0.222	0.0441	5.04	<.001
Q3.12_Satisf_AmbianTeam	0.154	0.0382	4.02	<.001
03.15_Satisf_ManagAttent	0.194	0.0360	5.38	<.001
Q3.6_Satisf_Skills	0.119	0.0409	2.91	0.004
Q3.3_Satisf_TaskVariety	0.105	0.0420	2.50	0.013

Table 3. Regression results regarding Job Satisfaction

Regression model with Job Pride (Q2) as the dependent variable

To avoid problems of collinearity between variables we used a multiple linear regression instead of the correlation coefficient. Our model indicates that 24% of the variance in pride in the workplace is explained by 4 specific factors. The most important is the meaning that the employee finds in the activities carried out at work (b =.34; p <.001). For every 1 point increase in the sense that the person finds in his work, we can predict an increase of 0.34 points in the pride that the person feels in his work.

Model Fit Measures

Model	R	
	0.487	0.238

Model Coefficients

Predictor	Estimate	SE		p
Intercept	2.0349	0.1698	11.98	<.001
03.7_Satisf_Meaning	0.3371	0.0419	8.05	<.001
03.12_Satisf_AmbianTeam	0.0875	0.0360	2.43	0.015
03.6_Satisf_Skills	0.1722	0.0396	4.35	<.001
03.3_Satisf_TaskVariety	0.1074	0.0418	2.57	0.010

Table 4: Regression results regarding Job Pride

Discussion:

The brief statistical analysis enable us already to draw several conclusions. Overall, sex and age make no difference regarding Job Satisfaction and Pride. Except, that women are under-represented in our sample in high hierarchical positions (which corresponds to the reality). Moreover, it appears that senior managers have a higher level of satisfaction than managers and employees. The factors that carry the most weight regarding Job Satisfaction is work recognition, meaning at work, and management's attention to employee well-being.

The most important factor regarding Job Pride is the meaning that the employee finds in the activities carried out at work. Based on these findings, we will be able to create a very short questionnaire for the human risk data collection system developed in parallel to this research, that covers most of the most recognized questionnaires in the scientific literature and can also be easily loaded from an app or tablet in order to measure human-related risks to provide a unique score for the company. This score can then be integrated into an enterprise risk mapping and allow for better governance that also integrates human risks alongside more traditional risk categories such as operational, financial, strategic and compliance risks.

Keywords: Human risk, Enterprise Risk Management, Quantitative Survey, Well Being at Work