Towards integrated and resource oriented management of wellbeing at work – opportunities of data mining techniques

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Introduction

Personnel's wellbeing is nowadays seen as a strategic objective in most organizations. Caicedo et al. (2010) argue that investments and assets such as training, education, experience, expertise, innovation, teamwork, leadership and flexibility of employees could be lost if the employees’ health and well-being is not secured. Work-related wellbeing has traditionally been measured and managed by history-based, narrow and often negatively-loaded indicators: e.g. absence and retirement rates, injury frequency rates and results of specific questionnaires such as stress, workload or burnout inventories. Contradictory, in the current research, work-flow, engagement, psychological capital, mindfulness, sense of meaningfulness and positive social interaction have been recognized essential for employees' well-being as well as for performance. Moreover, it has been argued that since employee wellbeing and performance are connected, their measurement systems should be integrated (Baptiste 2008).

Another powerful trend today is the rapid development of wellness technologies, appliances and services aimed at monitoring and encouraging healthier living: e.g. exercise, sleep, emotions and nutrition. In search of healthier and more productive working force and longer careers, their use by the employers has increased, and the effects of “worksite wellness” or “corporate wellness” are currently been actively researched as well. However, wellness programs and activities are rarely investigated in a comprehensive framework to evaluate how they support organizational goals, e.g. productivity, or employers wellbeing as a whole.

In this conference paper, an initial theory-based model for the development of resource oriented and forward looking and preventive wellbeing at work management and measurement tool is suggested. Purpose of the paper is to explore the theoretical background for integrative measurement of wellbeing at work and performance and the use of data mining techniques in its development. The paper is a product of the R&D-consortium DIGILE – Digital Services' workpackage “Wellness Services”, founded by Tekes - the Finnish Funding Agency for Innovation. The business case, to which this paper is linked, is carried out by Finnish startup companies Prolimpact Oy and Mobile Wellness Solutions Wellmo Oy, University of Tampere / School of Management, Technological University of Tampere / Department of Signal-Processing and University of Turku / School of Economics.

Main goal for 2014 of our work within Wellness Services work package is to further develop the definition of how to measure and manage impact of wellbeing at work and HR results as an asset for the company, to support decision making in the company. Our project focuses on researching and defining what are the most relevant metrics and
correlations to follow, what is the most valuable technical solution for required data acquisition, modeling and analysis and the optimal presentation of the information to the users i.e. decision makers. In this research paper, we will examine the theoretical background for the development of new solutions to manage and measure wellbeing at work. Drawing from the doctrines of positive organizational psychology, relational leadership and from the holistic model of wellbeing at work, we propose a theoretical framework to be tested with data-mining methods.

Theoretical foundations

In the knowledge economy, intellectual capital plays a central role in organisations' performance. According to e.g. Edvisson and Sullivan (1996), intellectual capital is defined as knowledge that can be converted into value. Intellectual capital (IC) contributes to not only firm’s value but also to its’ present and future performance (e.g. Chen et. al 2005). Probably the most often proposed structure for intellectual capital is that it includes human capital (HC), structural capital (e.g. organizational culture, infrastructure, technologies and processes) and social capital (i.e. useful relationships and connections both within the organization and with external parties). Human capital definitions do not always entail wellbeing as such, however, in most definitions it is somehow present. E.g. in Skandia’s early model, human capital was defined as a combination of knowledge, skill, innovativeness and the ability of each employee to meet the task at hand (Bontis, 2001).

During the past decade, more than 30 methods for valuation or measurement of HC have been presented in the literature (Andriessen 2004; Rompho & Siengthai 2012). Scholtz (2007) et. al incidentally recognize five approaches to measuring HC: market value based, accounting-oriented, value added, revenue-oriented and indicator-based. Murthy and Guthrie (2012; 2009) have identified, that human capital accounting has evolved from calculative modes to scorecard modes and further to narrative modes. Researchers have argued that efforts taken to transform people into financial numbers could be theoretically interesting, but would not assist managers in their functions (Sveiby, 1997). In this research project, mainly indicator based approach to human capital measurement is utilized, though looking at the financial impacts of various functions of HR and management and investments may also be part of the conclusions and implications. Clarification of the relationship between human capital as a whole and employees’ wellbeing will be a subject of further research.

In this research project, we concentrate on wellbeing at work, which we see as multidimensional, dynamic, perceived state of an employee, as proposed by Manka’s holistic model (1999). In the model, wellbeing at work is related to the work itself, the organization, leadership practices, team spirit / cooperation and the workplace. At the hearth of the wellbeing model is the employee himself: the physical as well as psychological resources. Attitudes act as mediating factor between the individual and his working conditions. We argue that in the new leadership and management, wellbeing should be seen not only as individual health and balance, but rather as a state where working is fluent and productive. We consider wellbeing at work as a basic condition for intellectual capital to develop. Therefore we feel it necessary to assure, that developmental efforts and investments are directed to functions and areas with demonstrated impact on fluency and productivity of work and other prominent organizational goals.
In this research paper, leadership is approached from a relational framework: it is understood to be constructed in the reciprocal action and interaction between the supervisor and the employees, i.e. in the social relationships in an organization (Uhl-Bien 2006). Here, it is essential to explore the interactive processes (Uhl-Bien 2006). The interactive character of leadership is approached through the LMX theory, according to which the leader-member exchange is depicted by mutual trust, professional respect, reciprocity, and investing in work. Accordingly, modern human capital measurement and management systems should support the idea of joint responsibility, co-operation and co-evaluation. Ideal tool would provide tools for self-management and self- and co-appraisal as well as targeted information and functions for different user roles (leaders / top management, line managers, HR, payroll, personnel etc.).

Moreover, we explore wellbeing at work drawing from positive organizational psychology, which refers to research and development practices focusing on resources, strengths and opportunities of the organization. According to the pioneers of positive psychology (e.g. Martin Seligman, Barbara Fredricksson and Marcial Losada), it is more productive to pay attention to the positive resources available and not so much to the weaknesses and deficiencies. Positive emotions broaden cognition, lead to behavioral change and upward spiral in mood (Fredricksson 2001). Positive psychology is practical and development-oriented by nature: Seligman (2011) argues that positive psychology should teach people effective pathways to improved happiness and wellbeing. Following from that, we argue that the lessons of positive psychology should be taken account, when developing measurement and management of wellbeing at work. The measurement process, e.g. how questions are formulated and how they direct employee’s thinking, is as important as the result of the measurement.
In this research project, we focus on the needs and the data practices of SME’s. SME’s (small and medium sized enterprises\(^1\)) form a solid and vital base for the Finnish economy, employing over 60% of the working force and producing over 50% of the total turnover in enterprises. In SME’s, the role of human capital is vital, as financial resources are often scarce and limited. In the human capital development, organization has practically two options; either to gather new resources (through recruitment) or to develop existing resources. The research suggests that the development through training can play a central role in innovation and consolidation of small and medium size organizations (Baldwin and Johnson, 1996).

Summing up, we argue that to be able to manage wellbeing and productivity proactively and strategically, more dynamic and resource-oriented practices are needed. Human resource management of a modern organization needs to adopt a strategic role in linking human capital investments and procedures to achievement of organizational goals - financial as well as other kind of goals. Managers’ tools need to address both issues simultaneously. Information available for managers to utilize in decision making and organizational development is abundant and simplifying patterns and technologies are needed. In a rapidly changing business environment, tools should be rather dynamic and progressive than static.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{Theoretical background of the research project (e.g. Manka M-L. 1999; Nuutinen et. al 2013; Uhl-Bien 2006; Fredricksson 2001)}
\end{figure}

\(^1\) defined as an enterprise employing 1-249 people and turnover max. 50 m or balance sheet total max 43 million euros (European Commission).
Overview of the research process and methodology

R&D project within Finnish DIGILE – Digital Services program (funded by Tekes – the Finnish Funding Agency for Technology and Innovation) aims at developing managerial solutions for identifying, managing and monitoring key factors which drive performance and employee wellbeing in an organization.

Time-span for the project is 1/2012 – 12/2015. In 2012, the goals for the project were formulated and the initial state-of-the-art analysis was conducted. Based on the findings, an initial model for data collection of the potentially meaningful issues was constructed (figure 2). In order to clarify the data-structures of SME’s and the availability of suitable data, we are now conducting interviews with the respondents of the firms. Next, data will be collected from the pilot companies and data mining techniques will be utilized to identify key factors which to include in the final data set. Pilot use in selected organizations and further development of the tool will be monitored and analysed. Attention will be paid to usability and perceived managerial relevance of the developed data set.

Figure 2. Initial model for data collection and analysis ("=data-mining")

New technological solutions for data collection, processing and analyzing provide fresh opportunities for approaching the issues mentioned earlier. In this research project, we explore the opportunities to use of data mining in developing managerial solutions and leadership approaches as well. Data mining and the utilization of "big data" refer to techniques applied to recognize valuable patterns of knowledge in large data sets, which can be used e.g. in organizational
management and decision making. Data mining differs from e.g. forecasting in a sense that its intention is not to find familiar patterns from the data, but to learn from the data itself: “to let the data tell the story” (Keating 2008)

Practicing traditional data mining has not necessarily called for domain specific expertise; it has been described as an autonomous data-driven trial-and-error process. However, to make full use of the technique, methodological expertise should be combined with understanding of the application field, e.g. human resource management / formation of human capital. Based on their comprehensive review of current research, Strohmeier and Piazza (2013) propose that human resources management constitutes a rather young domain of data mining research and it is dominated by method and technology-oriented work

Research contributions in the field of human resource management include e.g. selecting employees, predicting employee turnover, staffing, development planning and performance management. Data mining methods employed in the field are e.g. decision-trees, cluster-analysis, association analysis, support vector machines and neural nets. There are several domain specific requirements regarding to the HR context, which are not always recognized in previous research. Data mining in human resource management’s contexts needs to take account e.g. legislative matters (e.g. restrictions for data collection, utilization and communication, availability of suitable data and the practical usefulness of the findings. (Strohmeier and Piazza 2013)

**Expected contributions**

The main research interests in the current project are:

- Related to the human capital management and measurement, what kind of expectations and needs do SME managers and leaders have?
- What kind of data is available in SME’s or e.g. via pension insurance companies, which can be used to estimate the state of the wellbeing at work and human capital?
- Are data mining or other sophisticated data analysis techniques able to show valuable patterns in the data available from SME’s information systems?
- What kind of human capital measurement is possible and useful in SME’s?

Process-oriented development model for wellbeing at work was established in our previous R&D-project HAKU – “Measuring the value of human resources in Finnish municipalities” (Manka, Heikkilä-Tammi & Vauhkonen 2012). In the current project, we work to elaborate the model to three different levels, e.g. to specify the measures, actions and targets from the viewpoints of an individual employee, line managers and the top management / lead. This will help to integrate information and measures from different levels in one model.
We presume, that integrative analysis using data mining could be a valuable method for creating managerial solutions for the resource-limited and practice-oriented sector of SME’s, as it helps to summarize the most important targets and parameters to follow. Moreover, it may assist in building a bridge between the leadership and the management of “hard” and the “soft” operations and resources of the firm as well as between different levels to manage. As the volume and the sources of data available expand rapidly, it is important to scrutinize the theoretical background for its use as well.

Further in the project, the plan is to e.g. explore the use of employees’ personal wellness and exercise data (aggregated to e.g. team level) in developmental purposes and wellbeing management.
References:


