

Towards a Design Model for Job Crafting Information Systems Promoting Individual Health, Productivity and Organizational Performance

Research-in-Progress

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ABSTRACT

The nature of work has dramatically changed over that last decades: steadily increasing workloads and job-related pressure impact not only health and productivity outcomes of employees but also organizations' overall performance. The support of job crafting behavior is promising in this regard as it allows employees to balance job-related psychological and social demands and resources by proactively shaping their job characteristics. However, job crafting interventions require highly trained work and health specialists, resulting in low adoption rates by organizations until now. Due to the potential of cost-efficient and scalable IT-tailored interventions, we aim to develop design principles for so-called job crafting ISs (JCISs) by designing, implementing and evaluating several prototypes. As a first step, the current research-in-progress proposes a design model for JCISs that addresses three major limitations that are lack of (1) motivation theory in IS research, (2) research on job crafting behavior and (3) a multilevel perspective.

Keywords

Design model, job crafting, individual outcomes, organizational outcomes, multi-level research.

INTRODUCTION

Work has changed over the past decades resulting in steadily increasing workloads and job-related pressure. Comparing data from surveys conducted in the European Union, for example, a recent study reveals that work intensity (e.g. working to tight deadlines) has increased by nearly 15% over the past 20 years, with 74% of today's employees feeling required to meet very exact quality standards (EU, 2010). In Switzerland, 20% of employees believe their work to negatively impact their health

condition, with more than half of the jobholders reporting pain symptoms, sleeping disorders, or depressive symptoms and anxiety connected to work and job demands (Krieger, Pekruhl, Lehmann and Graf, 2012; Moreau and Obsan, 2012). Accordingly, WHO predicts that, by 2020, five of the top ten medical problems worldwide will be stress-related with work constituting a key source of stress in modern society.

The balance or imbalance of job-related psychological and social demands and resources, however, is not only linked to individual health behavior, mental and physical health outcomes (e.g. stress and burnout) (Boedeker and Klindworth, 2007), but also decreases the productivity of employees, organizations and society (Bond, Flaxman and Loivette, 2006). Sickness absence (Kuoppala, Lamminpää and Husman, 2008) or sickness presence (Burton, Chen, Conti, Schultz, Pransky and Edington, 2005), for example, account for yearly losses of up to 2.4 billion USD for the Swiss economy (Ramaciotti and Perriard, 2003). Additionally, negative health outcomes of job-related requirements burden the public health sector with costs of at least 1.5 billion USD a year, resulting in a total yearly forfeit of 1.2% of the Swiss gross domestic product (ibid.).

Prior research has shown that, in general, the promotion of a healthy lifestyle among employees has the potential to reduce sickness absence and to enhance employee health (Kuoppala et al., 2008; Mattke, Liu, Caloyera, Huang, van Busum, Khodayakov and Shier, 2013). In this regard, both individual-level interventions (e.g. personal trainings) (Richardson and Rothstein, 2008) and organizational-level interventions (e.g. job redesign and leadership development) (Holman, Axtell, Sprigg, Totterdell and Wall, 2010) have proven their capability to enhance the balance of job demands and resources. In particular, the concept of *job crafting* has drawn attention by researchers and practitioners in the field as it suggests that employees can take individual actions to reduce imbalances in job demands and resources by proactively shaping their job characteristics. Despite empirical evidence on the effectiveness of job crafting programs to enhance the balance of job demands and resources (Tims, Bakker and Derks, 2013), such interventions require highly trained work and health specialists, resulting in a rather limited dissemination in the field (Bauer and Jenny, 2012a).

IT-supported health interventions may not only enhance outcomes of such programs, but also reduce their costs and increase scalability (Agarwal, Gao, DesRoches and Jha, 2010), resulting in a high potential of ISs in supporting health promotion and disease prevention strategies in organizations. In particular, ISs used for health promotion, such as FitBit.com or HealthWatch.se, may offer a flexible and cost-efficient approach to improve job crafting behavior of employees, given that IT has become ubiquitous in employees' everyday life (Cousins and Varshney, 2009). Moreover, prior research on IS-supported health interventions has successfully applied distinct mechanisms of behavior change, such as information provision and reinforcement (Webb, Joseph, Yardley and Michie, 2010), or self-monitoring (Reed, Schifferdecker, Rezaee, O'Connor and Larson, 2012).

We therefore argue that ISs tailored to improve job crafting behavior, denoted as job crafting ISs (JCISs), may promote individual health and productivity outcomes of employees and thus, also organizational performance. However, exploiting these potentials requires JCISs to address at least three shortcomings of prior research: First, health intervention ISs generally lack sound theoretical underpinnings, and IS research has largely neglected *motivation theory* as an important driver of IS use. Second, individual-level health promotion interventions in organizations have largely focused on how to cope with high stress levels, neglecting the possibility to proactively influence the balance of job demands and resources by *job crafting* behavior. And third, former health intervention ISs have rarely considered *multiple levels* of implementation and outcomes, as promoted by IS and organizational health intervention research.

In addressing these shortcomings we aim to answer our research question: How must JCISs be designed such that they unfold their potential to impact individual and organizational health and productivity outcomes? As a first step, we propose a design model for JCISs that is motivated by the shortcomings from above and which aims to guide the design process of JCISs. For this purpose, we next elaborate on the three shortcomings before we propose the model. An outlook on future work concludes this research-in-progress.

SHORTCOMINGS OF PRIOR WORK

Lack of Motivation Theory in IS Research

Most studies on health-related ISs have been designed as mere evaluation studies, i.e. the process of designing on a sound theoretical base, as fostered by the IS community (Gregor and Jones, 2007), has been largely neglected. For example, in a meta-analysis of mobile-tailored health promotion interventions, 36 out of 49 original studies were found to not report a theoretical base at all (Riley, Rivera, Atienza, Nilsen, Allison and Mermelstein, 2011). Similarly, less than half of 85 analyzed studies in a meta-analysis of internet-based health behavior change programs were found to be guided by theory (Webb et al., 2010). In another meta-analysis, Romanow, Cho and Straub (2012) counted 61 atheoretical compared to only 29 theory-based studies. As a consequence, design theories for efficient and effective ISs are scarce, resulting in a lack of knowledge on the unique contribution of healthcare ISs, its design and implementation. Moreover, recent studies increasingly

argue intrinsic motivation to be a major driver of IS (continued) use (Gerow, Ayyagari, Thatcher and Roth, 2013; Mitchell, Gagné, Beaudry and Dyer, 2012; Wunderlich, Kranz, Totzek, Veit and Picot, 2013). By contrast, extrinsic motivation was found to only moderately impact usage predictors (Gerow et al., 2013). Webber, Tate, Ward and Bowling (2010), finally, reported a higher health intervention adherence and better success rates for participants who succeeded to develop a higher level of intrinsic motivation throughout an IS-supported weight-loss program.

These findings are in line with research on Self-Determination Theory (SDT) (Deci and Ryan, 2000; Ryan and Deci, 2000). In SDT, an intrinsically motivated activity is executed because the behavior is interesting and inherently satisfying, while extrinsically motivated behaviors are instrumental to some external outcome beyond the activity itself. As such, intrinsically motivated behavior occurs if three basic psychological needs are satisfied in the context of the respective activity: (a) the *need for competence* refers to people's innate desire to deal effectively with the environment, (b) the *need for relatedness* refers to the propensity to feel connected to other people and to establish close relationships, and (c) the *need for autonomy* concerns the desire to experience choice and volition, and to act in accordance with one's integrated self. Satisfaction of these innate and universal needs affect the quality of motivation.

While related fields have broadly discussed the role of intrinsic motivation and the fulfillment of basic needs, e.g. in the context of computer game engagement (Peng, Lin, Pfeiffer and Winn, 2012) or preventive health applications (Sundar, Bellur and Haiyan, 2012), only few authors have suggested principles guiding effective IS designs against the background of motivation theory (Zhang, 2007). In line with results from health psychology (Martin, Haskard-Zolnierek and DiMatteo, 2010), a design model for JCISs must consider motivation theory, expecting JCISs to be more effective if employees feel intrinsic motivation, and use them continuously (Chen and Wu, 2013; Ritterband, Thorndike, Cox, Kovatchev and Gonder-Frederick, 2009). In line with this argumentation, we incorporate SDT and the integrated research model of User Satisfaction and Technology Acceptance (IM-USTA) (Wixom and Todd, 2005) as justificatory knowledge that informs JCIS designs in order to follow existing knowledge on system attributes and user perceptions that impact JCIS use.

Proposition 1: A design model for JCISs must lead to design principles that are informed by *motivation theory* and address *intrinsic* rather than extrinsic motivation of employees in order to encourage IS use.

Lack of Research on Job Crafting Behavior of Employees

Despite the apparent need for effective and cost-efficient prevention strategies within organizations (Lohmann-Haislah, 2012; Ramaciotti and Perriard, 2003), existing health intervention ISs have largely focused on other fields of behavior and behavior change techniques. In a meta-analysis by Webb et al. (2010), for example, techniques promoting stress management (5 out of 85 analyzed studies) or emotional control (11 out of 85) were underrepresented compared to other types of health behavior. Similarly, Cook, Billings, Hersch, Back and Hendrickson (2007) concluded that “web-based techniques in the areas of stress [...] are less advanced than in the dietary area”, and Krebs, Prochaska and Rossi (2010) even abstained from including stress reduction programs to their meta-analysis due to the “insufficient number of same behavior for comparison” (p. 44). In addition to the scarce number of trials, IS-supported stress interventions have largely focused on how to *cope* with high levels of stress (Webb et al., 2010) instead of guiding employees to proactively influence the sources of stress by optimizing their balance of job demands and resources. In this regard, the concept of *job crafting* suggests that employees can take individual actions to reduce avoidable job demands and to enhance desirable job resources (Tims et al., 2013), while the job demands-resources (JDR) model illustrates the underlying dynamics of job demands and resources balance or imbalance (Bakker and Demerouti, 2007).

Referring to a benefit and costs view on job-related demands and resources, the JDR model considers two parallel processes: First, the health *impairment* process describes how high job demands such as high time pressure or interruptions at work lead to negative health outcomes (e.g. burnout). Second, the *motivational* process shows how job resources such as social support and recognition by colleagues and supervisors lead to positive mental health and productivity outcomes (e.g. work engagement). At the same time, the model predicts that high job resources buffer the health impairment process as protective job resources may mitigate the negative health impact of high job demands. Job resources and job demands cover, for example, clear and compatible responsibilities, suitable workloads, control over pace and patterns of work, conflict handling, social support or adequate change management (Mackay and Palferman, 2013). Job crafting behavior, therefore, subsumes desirable activities with regard to the avoidance of job demands and the enhancement of job resources (Tims, Bakker and Derks, 2012). That is, employees might, for example, proactively request support upon excessive demands or reorganize their daily routines in order to prevent interruptions during phases of high workload. Ongoing job crafting is related to health and productivity outcomes such as work engagement (Bakker, Tims and Derks, 2012) or team performance (Tims et al., 2013), and prior research showed that job crafting behavior may be fostered by offering employees tailored feedback on the level of their job demands and job resources (Tims and Bakker, 2010). Building on this body of knowledge, we expect JCISs to be a

promising, innovative and efficient way to improve balance of job demands and resources at work and the consequential health and productivity outcomes.

Proposition 2: A design model for JCISs must consider job crafting as a key behavior to improve employees’ job demands and job resources, and thus their individual health and productivity.

Lack of a Multilevel Perspective

Health intervention ISs have been predominantly evaluated in clinical or private consumer settings (Krebs et al., 2010; Reed et al., 2012; Webb et al., 2010), and only few studies have addressed the workplace as a possible site (e.g. Cook et al., 2007; Franklin, Rosenbaum, Carey and Roizen, 2006). We assume this underrepresentation to result from the challenging necessity to consider both individual aspects and the organizational context as key variables for a successful implementation of work-related interventions. That is, IS research focusing on health intervention at the workplace has to consider organizations as complex social systems, with constantly interacting multiple levels of investigation. Knowledge on the interactions in complex social systems, however, is limited in IS research (Burton-Jones and Gallivan, 2007; Racherla and Munir, in press), although it has been noted that narrowed, single-level investigations increase the likelihood of substantial shortcomings and erroneous inferences (Markus and Keil, 1994). Consistently, facilitating conditions (Mitchell et al., 2012; Venkatesh, Morris, Davis and Davis, 2003) are significantly correlated with the use of IS in organizations. Still, IS research lacks empirical evidence on multileveled interactions (Nan, 2011; Racherla and Munir, in press), and the few existing examples considering multiple levels of IS analysis have primarily focused on performance outcomes (Burton-Jones and Gallivan, 2007).

In contrast, organizational health intervention research has adopted a *systemic* view on organizations (Jenny and Bauer, 2013). That is, organizations are regarded as complex social systems where structures channel processes and are simultaneously shaped by these processes in a circular manner. In order to grasp this complexity and the consequences for health promotion in organizations, the organizational health development (OHD) model (Bauer and Jenny, 2012b; Jenny and Bauer, 2013) integrates knowledge from psychology, medical sociology and management sciences in order to illustrate (1) the impact of job demands and job resources on health and productivity outcomes, and (2) how job demands and resources result from continuous interactions between employees (with their individual characteristics of competency, motivation, and identity) and the organization (with its characteristics of structure, strategy and culture).

Building on these foundations, a design model for JCISs must also consider the organizational context and its interaction with individual characteristics in order to unfold effectiveness with regard to job crafting, job demands and resources and consequential health and productivity outcomes. This results in the need for a multileveled view on JCISs.

Proposition 3: A design model for JCISs must consider both the individual and the organizational perspective of organizational health promotion.

A DESIGN MODEL FOR JOB CRAFTING INFORMATION SYSTEMS

With regard to the limitations and propositions of the last section, our design model for JCISs is depicted in Figure 1. It gives an overview of the justificatory knowledge used to derive design principles for JCISs, their implementations and evaluations. Its rationale is given in the following.

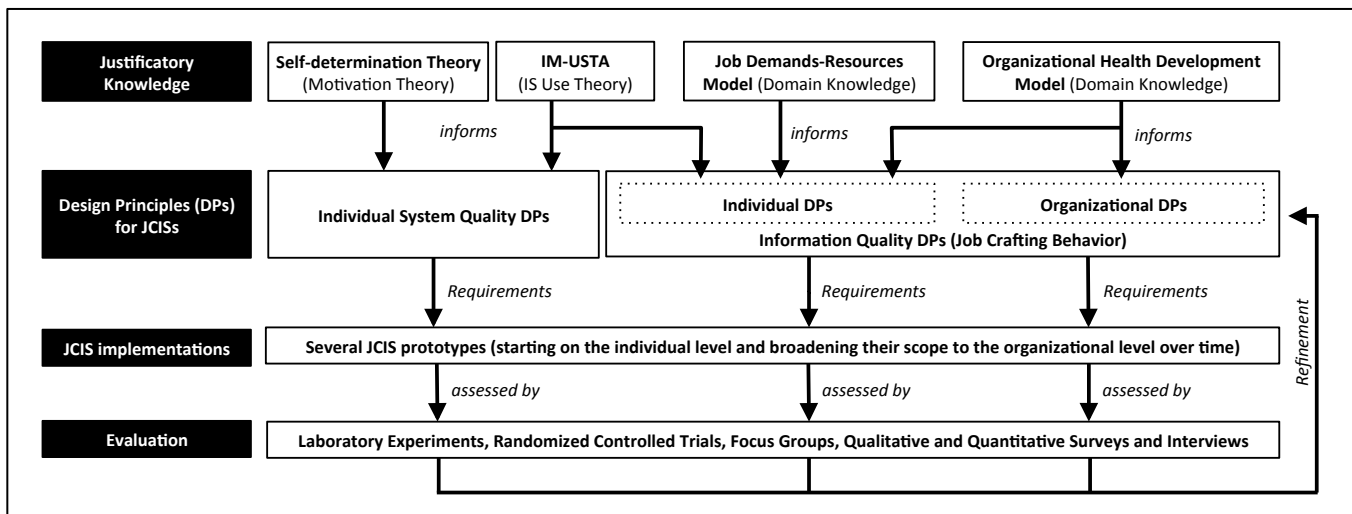


Figure 1. Design model for Job Crafting Information Systems (JCISs)

By adopting justificatory knowledge from psychology, IS research and organizational health intervention research, we explore ways to foster individual job crafting behavior via JCISs use. More precisely, we will first use IM-USTA, SDT, JDR and OHD to derive particular design principles for JCISs. Comprising research streams from technology acceptance and user satisfaction literature, the IM-USTA regards IS use as an outcome of system quality and information quality, which in turn shape user satisfaction with the system's operability and contents. IM-USTA provides insights to the relevant antecedents of both information quality and system quality, such as accessibility, completeness or accuracy. It also links system characteristics to user beliefs, and distinguishes attitudes *about* a system from beliefs about *using* a system. As such, it integrates several models used to explain IS use, rendering it a feasible and differentiated research framework for JCIS design principles tailored to foster system use, a major predictor of IS success and, in turn, health intervention adherence (Chen and Wu, 2013; Martin et al., 2010).

With regard to SDT, we assume that design principles for JCISs that consider basic human needs (i.e. autonomy, competence and relatedness) will result in technical implementations that create feelings of enjoyment and excitement in the employee, and impact the intrinsic motivation to use them on a regular basis. In doing so, the design principles derived from SDT will primarily impact the *system quality* attributes of JCISs, resulting in a JCIS that employees enjoy to use (van der Heijden, 2004). This argumentation is in line with prior research, stating that the fulfillment of basic human needs via technology is supposed to result in an approach rather than avoidance behavior (Zhang, 2007), that need fulfillment is positively related to hedonic product quality (Hassenzahl, Diefenbach and Göritz, 2010), that perceived enjoyment relates to hedonic rather than utilitarian systems (van der Heijden, 2004) and that perceived enjoyment is closely linked to technical quality (Lin and Bhattacharjee, 2010) predicting ease of use (Gerow et al., 2013; Xu, Benbasat and Cenfetelli, 2013).

By contrast, JDR and OHD are supposed to inform design principles for JCISs that are more closely connected to the *information quality* of JCIS implementations given that (1) job crafting behavior can only occur if guidance is provided in a complete and accurate manner, and (2) JDR and OHD comprehend a large body of research on the antecedents, mediators and outcomes of individual and organizational actions necessary to foster job crafting behavior. Jenny and Bauer (2013), for example, note that manifold structural, strategic and cultural aspects of the organization can be of relevance when designing a health intervention: formal latitudes of roles, working schedules, structural opportunities for social exchange and participation, transparent company goals, employee orientation, culture of trust and fairness, etc., all of which potentially influence job crafting behavior job. Thus, JCISs tailored to raise employees' awareness on how working processes shape both individuals and organizations (and vice versa) could support them in understanding and grasping opportunities of change rather than rejecting change processes in front of seemingly "unchangeable" organizations. Thus, we argue that JDR and OHD inform design principles for JCISs that will render their concrete implementations particularly useful with regard to advice and individual guidance of job crafting behavior.

The design model also outlines various evaluation approaches (e.g. laboratory experiments) that are proposed not only to validate particular JCIS implementations and design principles but also to assess their utility including other relevant predictors (e.g. perceived enjoyment during JCIS use) and effects (e.g. individual health and productivity outcomes and organizational performance) of JCIS use. Results of these evaluations are finally used to refine the design principles.

Overall, we expect that justificatory knowledge from IS research (IM-USTA), psychology (SDT) and organizational health intervention research (JDR and OHD) will help to design and implement particular JCISs capable to be both hedonic and utilitarian in nature. As recent empirical studies show, IS combining both aspects may be particularly effective in fostering IS use (Gerow et al., 2013; Petter, DeLone and McLean, 2013). The proposed design model for JCISs will guide future work as outlined below.

FUTURE WORK

As a next step, we will develop a set of validated design principles for JCISs by designing, implementing and evaluating JCIS prototypes. For that purpose, we will develop an evaluation model for JCIS that complements the proposed design model. In particular, this evaluation model will incorporate theoretical constructs and relationships between them. Furthermore, we will employ several study designs that fit to the evaluation model and are appropriate for the proposed lab experiments, RCTs, focus group discussions as well as qualitative and quantitative surveys and interviews. In doing so, we will also adopt relevant empirical instruments from prior research (e.g. Pejtersen, Kristensen, Borg and Bjorner, 2010; van der Heijden, 2004; Wixom and Todd, 2005) that are able to capture the relevant dimensions of the evaluation model. First design principles, prototypes and empirical results are expected in 2014.

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