Print ISSN: 2233-4165 / Online ISSN: 2233-5382
doi:http://dx.doi.org/10.13106/ijidb.2018.vol9.no9.35.

The Effects of the Electronic Health Record System on Work Overload and Stress Moderation of Hospital Employees

Young-Jin Choi*, Jin-Won Noh**, Yoo-Kyung Boo***

Received: July 2, 2018. Revised: July 5, 2018. Accepted: August 15, 2018.

Abstract

Purpose - In endless competition, companies pursue cost reduction and work efficiency. So, entrepreneurs try to increase job intensity, which may lead to job stress and high turnovers because of job burnout. But, Information systems are acknowledged as a work support tool that secures work convenience and the productivity of employees. In this study, we aimed to confirm the effects of information systems in reduing the work overload of employees in a human resource intensive industry.

Research design, data and methodology - This is based on the job demands-resources model, conducting an empirical analysis of surveys given to hospital employees working in a human resource intensive industry.

Results - The research revealed that information systems reduced the work overload of employees in a human resource intensive industry.

Conclusion - This study confirmed the effects of information systems as a job resource based on JD-R theory, and presentation of empirical results indicated that information systems alleviate employee job overload and increases job satisfaction in the medical services industry. In the medical services industry, using electronic health record system decreases in work overload, which results in employees gaining time for self-development and time management, reducing job stress, and leading to job satisfaction.

Keywords: Job resource, Job demand, Job satisfaction, Job stress, Electronic Health Records.

JEL Classifications: I12, I19, J28, J44.

1. Introduction

Work productivity is the value of work outcome, which influenced by the structural factors of an organization, as well as, by organizational learning and technological innovation factors (Argyris & Schön, 1996; Damanpour, 1991). Work productivity can be enhanced through job intensity, but it may lead to a job stress and a turnover because of job burnout (Singh, 2000).

Information systems are a strategic resource to secure the competitiveness of a company, and at the same time, are acknowledged as a work support tool that secures work convenience and the productivity of employees (Kaplan & Norton, 1992).

According to JD-R Theory, job demands cause reductions in job satisfaction via an increase in job stress. But, job resources reduce job stress and ultimately enhance job satisfaction (Bakker & Demerouti, 2007). Therefore, utilizing job resources may regulate job stress, and improve work efficiency. Specially, Information systems, a type of organizational job resource, play the role of reducing employees' work load and reduce job stress related to job performance (DeLone & McLean, 1992; Goodhue, 1998).

Even though, IT is a specific type of organizational resources, former researches focused on the causal relation between IT technical factors and use of intention or performance (DeLone & McLean, 2003; Myers, Kappelman, & Prybutok, 1997). Therefore, to supplement these previous studies, this study created a model based on JD-R Theory including IT resources, and used structural equations, to

* First Author, Department of Healthcare Management, Eulji University, Korea.
** Co-Author, Department of Healthcare Management, Eulji University, Korea.
*** Corresponding Author, Department of Healthcare Management, Eulji University, Korea.
Tel: +82-31-740-7150, E-mail: shscool@eulji.ac.kr

perform a path analysis among constructs that are included in the causal relationship. In particular, this study conducted a survey for employees at hospitals that use the EHR system, in order to verify the effects of information systems in a service industry.

Job intensity may lead to a job stress and a turnover because of job burnout. But, Information systems are acknowledged as a work support tool that secures work convenience and the productivity of employees. We aimed to confirm the effects of information systems reduced the work overload of employees in a human resource intensive industry. Therefore, to supplement these previous studies, this study created a model based on JD-R Theory including IT resources, and used structural equations, to perform a path analysis among constructs that are included in the causal relationship. In particular, this study conducted a survey for employees at hospitals that use the EHR system, in order to verify the effects of information systems in a service industry. This study composed of introduction, review of literature, materials and methods, results, discussion, and conclusion.

2. Review of Literature

Tasks contain elements related to stress or motivation, and these elements are largely influenced by job demand and job resources (Bakker & Demerouti, 2007). Job demand refers to the 'state of demanding continuous physical or mental efforts from employees', and generates psychological costs such as burnout (Lee & Ashforth, 1996). Job demand is not always negative, but when it demands effort and definite cost, it may become a factor in role stress or job stress.

Job overload is divided into work overload and emotional demand; work overload is not being able to perform a job due to insufficient time or the difficulty of work which leads to excessive work requirements. Further, emotional demand originates from role conflict and role ambiguity. Excessive work overload causes job stress, which reduces job satisfaction, and leads to employee turnover (Sonnentag & Zijlstra, 2006).

Job resources refer to physical, psychological, social or organizational resources that may help an individual's development and growth. These resources decrease physiological and psychological costs, arising from job demand, and encourage goal achievement or individual growth, learning and development (Podsakoff, LePine, & LePine, 2007). Of these, organizational job resources include wage level, information systems, career opportunity, job security and perceived justice. Generally, when job demand is higher, job satisfaction is lower, and as the subjective evaluation of job competency is higher, job satisfaction increases (Webber, Smith, & Scott, 2006).

Information system performance evaluation models include the IS Success Model (DeLone & McLean, 2003), IS Function Performance Evaluation Model (Saunders & Jones, 1992), Comprehensive IS assessment Framework (Myers, Kappelman, & Prybutok, 1997), and Task-Technology Fit (Goodhue, 1998). The IS Success Model by Delone and Mclean (2003) conducted a study covering information system success categorization as a measuring tool, and suggested a framework that evaluates the efficiency of information system functions as: system quality, information quality, use, user satisfaction, individual impact and organizational impact. In this model, system quality is the tool that measures technical success, information quality measures semantic success. Further, use, user satisfaction, individual impact and organization impact are tools that measure effectiveness. Also, this model structuralized each level in terms of their process relationship and casualty, and suggested that each level is inter-relational, rather than independent. Pitt, Watson, and Kavan (1995) pointed out that DeLone and McLean's model only includes system aspects, but neglects the human aspect. They suggested the IS Success Model by adding service quality to the DeLone and McLean model.

The behavioral causality model states that, as the expectation of 'IS use' increases, the level of use increases. In this situation the result of IS use appears as individual, organizational, and social outcomes. When such results correspond to the goals of the persons concerned, perceived usefulness and user satisfaction, which are the core of system success, occur based on their perspective. Information technology is a factor that directly affects an individual's job. While the complexity may increase, and it may take a significant amount of time until it become familiar, the results are a significant effect once familiar (Cappelli, 1996).

3. Materials and Methods

3.1. Research Model and Hypotheses

In a hypercompetitive environment, employees' productivity is a company's major competitive advantage. A company's effort towards the improvement of productivity generally means an increase in an employee's job demand. Excessive job demand is a factor that leads to employee job burnout and job stress (Schaufeli & Bakker, 2004). But, job resources play a role in alleviating employees' job burdens arising from the demands for their job. In addition, they reduce the stress caused by the job, and act as an influence that enables employees to interpret their job environment more positively. Specifically, organizational job resources are the functional resources needed to achieve a goal, and information systems are one of these resources

(Bakker & Demerouti, 2007).

Recently, the introduction of EHR (Electronic Health Record) system is actively occurring in hospitals. Utilization of EHR system in hospitals can reduce the work burden that occurs in the process of manually recording medical records, and reduces work overload, as well as, the effort needed to manually file and deliver files, since the record is delivered electronically. There is also an improvement in accuracy.

Therefore, based on the JD-R Model, this study modeled the process to increase job satisfaction, as a result of decreased job overload, and decrease job stress by using information systems, as a job resource, in an environment where job stress increases, and job satisfaction decreases, due to an increase in job demand in the Figure 1.

Job resources enhance job commitment and work productivity by reducing physiological and psychological burdens on employees, which arise from their job (Podsakoff, LePine, & LePine, 2007). Information system is an organizational job resource that positively affects employees' work participation. Further, insufficiency of job resources causes job burnout due to employee job overload (Bakker & Demerouti, 2007). Therefore, while job resources reduces job stress, employees with insufficient job resources experience accumulated job burdens, which causes stress to occur faster (Crawford, LePine, & Rich, 2010).

Information systems not only secure a company's strategic superiority by using innovative information technology, but support employees' ability to process work conveniently and accurately which enhances their work efficiency. Organizational performance results are decided based on the level of correspondence with the management strategy. Meanwhile, individual performance is realized by improvements in speed and accuracy of work processing,8 or the effects on the performance of users of information systems (Iivari, 2005; Mohd, Lazim, & Hassan, 2016). These things result in reduced work overload and increased work efficiency. Therefore, this study established the hypotheses that employees' use of EHR system will lead to an increase in work efficiency and a decrease in work overload.

<H1> Employee use of the EHR system will reduce work overload.

<H2> Employee use of the EHR system will enhance work efficiency.

Job stress is examined from the aspect of stress-causing factors, responses, and the correlation between individual and environment. Studies on job stress-causing factors have been focusing on the job demands that require continuous mental and physical effort from employees and the job stress that arises from it (Parker & DeCotiis, 1983). These studies summarize job stress as excessive job demands leading to deteriorated vitality of body and mind, fatigue, anxiety, and depression in employees (Bakker & Demerouti, 2007).

Job stress is determined by job demand and job resources. Job overload caused by job demand means a situation, wherein, an expectation on members of an organization exceeds individual capability, or employees are forced to rush or perform certain task carelessly (Peter, 1986; Ahmed, Majid, Mohd, & Lazim, 2016). Simply, employees experience conflict, due to too many roles, as they are given new assignments aside from their daily tasks. Also, when they can't finish a job due to insufficient time, or are at the quantitative overload status, where they can't perform tasks due to the excessive amount of them, job stress may occur.

Meanwhile, job resource, which is the opposite notion of job demand, supports employees with feedback and job control to affect their job commitment and emotions positively. Insufficient job resources cause employee job burnout (Schaufeli & Bakker, 2004), and high levels of job resources promote development and growth, and satisfy the need for autonomy and ability. This also increases employees' internal motivation to devote their efforts and abilities for work. Bakker et al., in a study on call center employees, verified that job resources are a positive influence on employee work commitment (Bakker & Demerouti, 2007). Job resources enable employees to satisfy job demands more easily, and help them to protect themselves from burdens due to resource depletion. Therefore, a high level of job resources reduce job stress, while a low level of job resources add to employee burden, which causes stress to occur faster (Crawford, LePine, & Rich, 2010). This study's hypotheses stated that, when employee job overload reduces, job stress reduces. Also, high levels of efficiency in work processing lead to possibilities to invest in self-development, or take more personal time, which leads to a reduction in job stress.

<H3> Decreases in employee job overload will lead to a decrease in job stress.

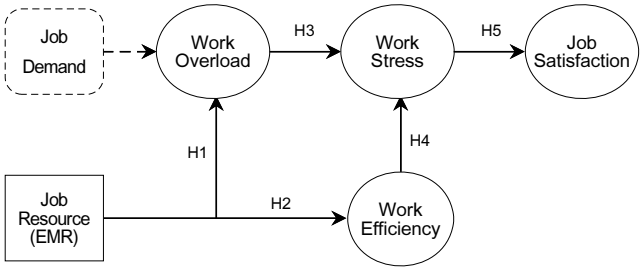
<H4> High efficiency in employee work processing will lead to a decrease in job stress.

Job satisfaction is a positive state of emotion that an individual possesses when evaluating one's job or job experience (Spector, 1997). Not only is it highly related to the performance of an organization that the individual belongs to (Jones, Jones, Latreille, & Sloane, 2009), it also affects the quality of an individual employee's life. Studies on employee job satisfaction have been continuously conducted, because first, job satisfaction is closely related to employee job commitment, absence rate and turnover intention, and second, it is significant in employees' subjective perception and satisfaction in life.

Generally, when job demand is high, job satisfaction is

low. In the relationship between stress and job satisfaction, employees performing jobs with low stress show the lowest level of job dissatisfaction, and employees with high levels of stress show the highest levels of job dissatisfaction (Landsbergis, Schnall, Deitz, Freidman, & Pickeringl, 2004; Webber, 2006). Therefore, this study established the hypothesis that increases in employee job stress will reduce job satisfaction.

<H5> Increases in job stress will decrease employee job satisfaction.



<Figure 1> Conceptual Framework

3.2. Sites and respondents

This study conducted a survey on employees at hospitals that have introduced the EHR system. The survey was distributed to 500 medical record technicians that attended a supplementary training conducted by the Korean Medical Record Association. In total 286 copies were collected, showing a 28.6% rate. There were no duplicate respondents. This study was reviewed and approved in advance by the Institutional Review Board of Eulji University (EU-2013-35). The study was conducted after gaining consent from study subjects and by the approved protocol.

General characteristics of respondents are as seen in <Table 1>. In terms of socio-demographic characteristics of respondents, 129 of them were in their 20s (50.19%), followed by 76 respondents in their 30s (29.57%), 37 in their 40s (14.4%), and 15 were over 50 years of age (5.84%). There were 252 female respondents (89.05%) and 31 males (10.95%). For education level, 185 of them had university bachelor's degree (64.46%), followed by 54 with a two-year college degree (18.82%) and 48 with a master's degree or higher (16.72%). For work experience, 79 had less than 5 years of experience (29.59%), followed by 61 with 5-11 years of experience (22.85%), 46 with 11-16 years of experience (17.23%), and 36 with 16-21 years of experience (13.48%).

<Table 1> General Characteristics of Respondents

Description		N	%
Age	20~29 years	129	50.19
	30~39 years	76	29.57
	40~49 years	37	14.40
	Over 50 years	15	5.84
Gender	Men	31	10.95
	Women	252	89.05
Work experience	Under 5 years	79	29.59
	5~11	61	22.85
	11~16	46	17.23
	16~21	36	13.48
	Over 21	45	16.85
Education	College	54	18.82
	Bachelor	185	64.46
	Master	48	16.72

3.3. Measures

The survey was developed by referring to the previous literature, which included similar constructs to this study in the Table 2. Each of the survey items was measured using a five-point Likert scale with responses ranging from 'strongly disagree' to 'strongly agree'.

The initial version of the questionnaire was pre-tested by faculty and industry members. They reviewed each item to improve the content and construct validities. The items were validated and some wordings were changed to accommodate the context of using an EHR system. After this step, as illustrated in the Table 3, 20 items were prepared for the survey.

Information systems were found effective, as a resource for organizations, when the users used it, and not just when they were adopted. Therefore, the 4 items in perceived ease of use, used by Venkatesh and Morris (Venkatesh & Morris, 2000), were used after being defined as user convenience in EHR utilization.

Work efficiency is similar to task performance and can be defined as "the proficiency with which individuals perform the core substantive or technical tasks central to his or her job" (Bartel, Ichniowski, & Shaw, 2007). For work efficiency, 5 items were prepared by combining Venkatesh and Morris's perceived usefulness on information systems and Koopmans et al.'s items on task performance (Koopmans, Bernaards, Hildebrandt, van Buuren, van der Beek, & de Vet, 2014).

Work overload is the general psychological demand of mental workload, and it was measured with a scale derived from Bakker et al., and Karasek (Bakker, Hakanen, Demerouti, & Xanthopoulou, 2007; Karasek, 1985). The scale included three items that refer to demanding aspects of the job that are quantitative in nature (e.g. time pressure, working hard).

Work stress refers to factors in the work environment that may lead to straining reactions such as negative arousal, physical symptoms, or psychological impairments (Schaufeli & Bakker, 2004). Work stress can be grouped into various categories. From job stress, in general, this study focuses on task-related stressors such as: time pressure and work overload, work complexity, interruptions, and situational constraints that potentially interfere with task performance. Work stress can be defined as the harmful physical and emotional responses that occur when the requirements of a job do not match the capabilities, resources, or needs of the worker. Job stress can lead to poor health and even injury. For job stress, 6 items used by Marteau and Bekker were used in this study (Marteau & Bekker, 1992).

The MSQ (Minnesota Satisfaction Questionnaire) short form is comprised of intrinsic and extrinsic job satisfaction. Intrinsic job satisfaction refers to how people feel about the nature of job tasks themselves. Extrinsic job satisfaction refers to how people feel about aspects of their work situation that are external to the job tasks, or work itself (Goodhue, 1998). Intrinsic job satisfaction seems to be influenced, to a greater degree, by genetic factors than extrinsic satisfaction (Spector, 1997; Sousa, Cruz, & Martins, 2011). This study used intrinsic job satisfaction.

<Table 2> Measurement Items

Category	Item	Source
Job Resource (EHR)	Clear and understandable. Require mental effort Easy to use Easy to get	Venkatesh & Morris (2000)
Work efficiency	Increases productivity Enhances effectiveness Managed plan Minimal time and effort Separate main issues	Koopmans et al. (2014) Venkatesh & Morris (2000)
Work overload	Work fast Work hard No excessive work Enough time Hectic job	Karasek (1985) Bakker et al. (2007)
Work Stress	Calm Tense Upset Relaxed Content Worried	Marteau & Bekker (1992)
Job satisfaction	Work alone To be somebody For other people Use abilities Feels accomplishment	Spector (1997) Sousa, Cruz, & Martins (2011)

<Table 3> Reliability and Validity

Category	Non-Standard Loading	S.E	C.R	Standard Loading	AVE	Construct Reliability (C.R)
System use → Use 1	1			0.859	0.710	0.905
System use → Use 2	1.182	0.073	16.26	0.896		
System use → Use 3	0.913	0.074	12.34	0.702		
System use → Use 4	0.801	0.077	10.347	0.613		
Job efficiency → job efficiency 1	1			0.7	0.598	0.811
Job efficiency → job efficiency 2	1.305	0.155	8.338	0.889		
Job efficiency → job efficiency 4	0.83	0.105	7.906	0.559		
Work overload → Work overload 5	1			0.675	0.644	0.878
Work overload → Work overload 3	-0.892	0.096	-9.299	-0.671		
Work overload → Work overload 2	1.078	0.103	10.428	0.772		
Work overload → Work overload 1	1.279	0.116	11.018	0.846		
Job stress → Stress 3	1			0.804	0.537	0.853
Job stress → Stress 4	-0.83	0.073	11.399	0.7		
Job stress → Stress 1	-0.936	0.078	11.929	0.728		
Job stress → Stress 6	0.849	0.073	11.656	0.714		
Job stress → Stress 2	0.991	0.081	12.188	0.741		
Job satisfaction → Job satisfaction 5	1			0.705	0.770	0.930
Job satisfaction → Job satisfaction 4	1.354	0.106	12.775	0.897		
Job satisfaction → Job satisfaction 1	1.035	0.095	10.943	0.739		
Job satisfaction → Job satisfaction 2	1.182	0.098	12.052	0.822		

4. Results

4.1. Reliability and validity

For data analysis, this study adopted a two-stage analysis for structural equation modeling, in which, the measurement model was first estimated. Subsequently, factor analysis was used, with the measurement model fixed in the second stage when the structural model was estimated. Five items were eliminated in the factor analysis stage, and 20 items were ultimately selected.

The content validity was first established by ensuring that the measurement items were consistent with those in the literature. Then, the convergent validity was assessed by examining the composite reliability and the average variance extracted (AVE) from the measures. The value of the composite reliability ranged from 0.811 to 0.93, as shown in <Table 3>. It is higher than the 0.7 threshold commonly used for acceptable reliability. Also, the AVE values for measurements in this study ranged from 0.537 to 0.77, which is higher than the threshold of 0.5 for acceptable convergent validity (Bagozzi, 1978; Formell & Larcker, 1981).

Finally, discriminate validity was assessed by examining the correlations between the constructs, and the square root of the AVE. The value of the square root of the AVE, ranged from 0.537 to 0.77, which was greater than the square of all the constructs, as shown in <Table 4>.

<Table 4> Correlations between Constructs

Category	System Use	Job efficiency	Job Burnout	Job Stress	Job Satisfaction	AVE
System Use	1					0.71
Work Efficiency	0.275**	1				0.598
Work Overload	-0.121	-0.067	1			0.644
Job Stress	-0.141	-0.160	0.434**	1		0.537
Job Satisfaction	0.151*	0.041	-0.016	-0.437**	1	0.77

4.2. Overall model fit

The study was analyzed in terms of maximum likelihood estimates, using AMOS 18.0, with the sample correlation matrix for all indicators as the input matrix. This study assessed the overall fit of the model to ensure that it was an adequate representation of the entire set of causal relationships. Three types of goodness-of-fit measures were examined: absolute fit measures, incremental fit measures, and parsimonious fit measures. The results of the goodness-of-fit measurements for SEM are displayed in <Table 5>.

The normed Chi-square (1.596) for the model was found to be within acceptable threshold limits (1.0–3.0), and the Comparative Fit Index (0.957) indicated a good fit. The GFI was 0.905, which is the commonly accepted threshold level. Furthermore, the RMSEA value of 0.048was within the recommended range under 0.1. The non-normed fit index (NNFI), and adjusted goodness of fit index (AGFI), were 0.90 and 0.84.

While the p value in the Chi-square (χ^2/df) and AGFI value were slightly lower than the recommended level, these two indices are regarded as too restrictive in model validation. Chi-square (χ^2/df) sometimes results in a model rejection even when the model is properly specified, and AGFI could be too sensitive to sample size (Hooper, Kroon, Rimm, Cohn, Harvey, & Le Cornu, 2008). In this respect, Hooper et al. and Wheaton et al. suggested relative/normed chi-square as an alternative to Chi-square (χ^2/df) (Hooper, Muthén, Alwin, & Summers, 2008; Wheaton et al., 1977). Based on these, the Normed Chi-square value of 1.596 in this study was acceptable. In addition, considering the modest sample size, the slightly lower value of AGFI (0.879) could also be acceptable. In sum, the overall model fit measures indicated that this model was marginally acceptable.

<Table 5> Indices of Model Fit

Measures	Recommended level	Research model
Absolute fit measures		
Chi-squared/df (p-value)	p> 0.05	263.373/165 (p < 0.01)
Goodness of fit index (GFI)	> 0.9	0.905
Root mean residual (RMR)	Lower	0.044
Root mean square error of approximation (RMSEA)	<0.10	0.048
Incremental fit measures		
Non-normed fit index (NNFI)	> 0.9	0.9
Adjusted goodness of fit index (AGFI)	> 0.9	0.879
Parsimonious fit measures		
Normed Chi-square	1.0-3.0	1.596
Comparative fit index (CFI)	> 0.9	0.957

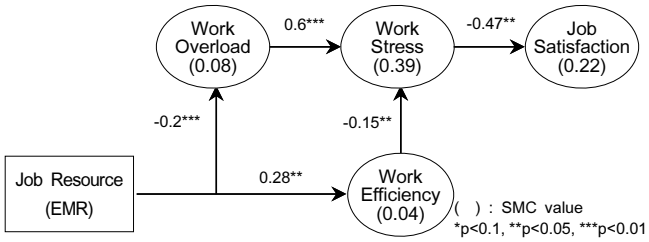
4.3. Test of Hypothesis

The path significance and its explanatory power represented as SMC were examined with the maximum-likelihood estimates method of AMOS 18, and the hypotheses were tested by calculating the significance of the path coefficients (t-values). A strong causal relationship with a path coefficient of -0.20*** was revealed for the EHR utilization impact on the job overload and 0.28*** on the job efficiency, which implied that HER, a job resource, influences job implementation situation and willingness.

In addition, the statistical test indicated, with a path coefficient of 0.60***, that job stress increases when job overload increases. However, when job efficiency increases, job stress will decrease by -0.15**. Finally, the reduction of job stress turned out to significantly affect job satisfaction

with a path coefficient value of -0.47***. The results verified that 22% of job satisfaction variations were explainable from the EHR exploitation in the Figure 2. The statistical test supports all of the five hypotheses even though some paths are significant at the 0.05.

The empirical test results revealed the mechanism of how IT resources could contribute to decreased job stress, and finally increase job satisfaction. Since this study was conducted in Korea, where workers experience stress from increasing job demands, and also, the studied organizations provide EHR systems, which are a job resource, the results offered practical insight as to the EHR exploitation focus. That is, job satisfaction could increase through a reduction in job stress, which is influenced by job resources.



<Figure 2> SEM Results of the Causal Relationships

5. Discussion

This study verified that job overload, caused by job demand, increases employee job stress. This result supports the existing study (Schaufeli & Bakker, 2004) which stated that job overload causes job stress. In particular, this study considered the harm, due to emotional labor, unique in the service industry (Grandey, Fisk, & Steiner, 2005; Hochschild, 1979). This study also considered job burnout intensifying (Ruotsalainen, Verbeek, Mariné, & Serra, 2014), and focused on role overload among the notions of various job demands, including role overload, role conflict and role ambiguity.

In the hospital industry, employee work stress is increasing due to work overload, but management is not assigning enough manpower to reduce the workload. As hospital employees' levels of job burnout, and emotional labor, are becoming job performance issues, they have become major topics of study. Since increasing job stress, due to job overload, presents itself in the form of decreased job satisfaction and turnover, as well as, hindering employee loyalty and job commitment, it is an object of interest for all levels of management. Therefore, the results of this study have encouraged the management, of participating hospitals, to acknowledge employee's physical exhaustion due to excessive work and understand the importance of managing employee's job overload in a manpower-intensive service industry.

Job overload works against job demand but reacts positively when influenced by job resources. This study presented empirical results showing that job resources reduce job overload. This supports the results of existing studies, especially by focusing on job resources at the organizational level, verifying the effects of instrumental resources among organizational job resources. In other words, this study verified that an EHR system, as a part of a hospital information system, contributed to enhancing work process efficiency. This coincides with the result of a previous study (Kaplan & Norton, 1992) which stated that information systems, as a job resource, increase the accuracy and efficiency of employee work processing. This means that, the accuracy and efficiency of information systems allows employees to process work more effectively, thus giving employees more time to control their job, which will reduce stress related to the job. Therefore, hospitals should more actively utilize information resources that support employees' work processing.

Also, this study presented an empirical result showing that job stress is a factor that reduces employee job satisfaction, which also supports the results of a previous study on the relationship between job stress and job satisfaction (Landsbergis et al., 1992) This explained the relationship of job satisfaction, due to job demand, more accurately by using job stress as a parameter to compare to the previous study, which stated that higher job demand leads to lower job satisfaction (Karasek, 1985) In companies that operate in the service industry specifically, manpower is the most important asset, and a major factor that decides a company's competitiveness and future. Some executives may view manpower as an object for cost control, but manpower is the future and livelihood of the company. Therefore, employee job satisfaction is an often overlooked, but incredibly important factor that executives should manage with care.

In an environment of endless competition, companies pursue cost reduction and work efficiency. This often leads the quality, and quantity, of job demands on employees to increase. Such increases in job demand generally increase employees' job stress, and increased job stress is known to be the most direct factor that reduces employee job satisfaction. Therefore, executives who need to increase job satisfaction should make an effort to reduce job overload.

The hospital has the added problem of emotional labor, whereby, employees have to respond kindly to customers in situations that, not only require frequent contact and services, but also occur in situations related to health, which are emotionally taxing on patients and result in an increased emotional investment from hospital staff. Along with typical job stress, this emotional labor leads to occurrences of job burnout. Therefore, for hospital management, whose role is to control employees' job overload and reduce their job stress, the additional emotional stress should be considered heavily. In such an environment, information systems that support work are considered a means to enhance work

efficiency by increasing the speed and accuracy of job processing. Therefore, many organizations are replacing part of the work done by hand with information systems, or adopting them to support the employees in charge of that job.

Over the last decade, IT research has debated productivity paradox, which does not appear to have a positive effect on firm's productivity (Bryniolfsson & Hitt, 1998). Some reasons of IT productivity paradox are mismeasurement, time lag, poor usability, and mismanagement of IT. But, it is accepted that IT usage improves worker's productivity (Bakker, Hakanen, Demerouti, & Xanthopoulou, 2007).

In this study, empirical results confirmed that the introduction of information systems, a job resource, can reduce job overload. Also, this study verified the usefulness of information systems, in the labor intensive hospital industry, for reducing job overload. Therefore, not only does the introduction and utilization of EHR at hospitals reduce employee job overload, it also increases the efficiency of work, which is known to be the essential effect of information systems. Further, since this allows employees to control their time, and provide opportunities for self-development, along with improving accuracy of work and reducing job stress, the necessity of actively utilizing information systems was suggested for management.

This study established and verified the causality model based on JD-R Theory that job demand increases job overload, which increases job stress and reduces job satisfaction. By verifying the previous study model, which showed a mediating effect of job stress in the relationship between job overload and job satisfaction, this study verified that job stress is directly correlated to job overload which affects overall job satisfaction. Aside from this JD-R Theory, there are previous studies in information systems which show that the use of such systems contributed to job satisfaction by increasing work efficiency (DeLone & McLean, 1992; Dewett & Jones, 2001). However, such studies were not able to explain how job efficiency converted to job satisfaction, which is a type of psychological satisfaction.

This study constructed a model by combining JD-R Theory and the IS Success model. As they became one single study model, this study verified the importance of an information system, which is an organizational resource, which had not yet been sufficiently discussed or verified in previous JD-R Theory. Also, the process of usefulness of information systems, which was not explained in the IS Success Model, which appeared as a psychological factor of job satisfaction, was more clearly explained through the medium of job stress. Therefore, it is significant that this study provided empirical grounds to indicate information resources clearly in the existing JD-R Model. It also suggested an integrated model of the IS Success Model and JD-R Model, and also, empirically verified the compatibility of the model.

6. Conclusion

Manpower is the most important asset and a major factor that decides a company's competitiveness. As a result, employees' job satisfaction is one of the most important elements that the executives should manage. Therefore, companies are focusing on motivation and welfare to increase employee satisfaction. Unfortunately, in endless competition, companies pursue cost reduction and work efficiency at the same time. Such increases in job demand generally increase employee stress. Further, increased job stress is known to be the most direct factor that reduces employee job satisfaction.

Therefore, based on the JD-R Model, this study empirically verified, using path analysis, the process by which, utilizing information systems, job satisfaction is increased by reducing employee job overload and job stress in an environment of increased job stress, and decreased job satisfaction, arising from an increase in job demand.

In particular, this study carries the following significance in empirically verifying the effects of using EHR in the medical service industry: (1) Verification of the usefulness of an information system as a job resource based on JD-R Theory, (2) Presentation of empirical results indicating that information systems alleviate employee job overload and increases job satisfaction, (3) Presentation of grounds to decide to on the investment of information systems for executives having trouble deciding whether or not to introduce a system, when the tangible benefits of introducing that system is insufficient. This is done by empirically suggesting that the introduction of an information system is a major organizational resource that can reduce employee job stress and enhance work satisfaction, (4) lastly, presentation of a new theory which combines organizational theory and information system theory together.

However, along with such significance, this study has limitations such as (1) a minimal scope which arises from targeting only hospitals, and (2) limiting the definition of job overload and job stress as only physical and timely overload. Follow-up studies should expand the scope of the industries studied, along with the sub-factors of job overload in the verification process.

Key points

1. Job intensity may lead to a job stress and a turnover because of job burnout. But, Information systems are acknowledged as a work support tool that secures work convenience and the productivity of employees.
2. We aimed to confirm the effects of information systems reduced the work overload of employees in a human resource intensive industry.
3. The study revealed that information systems reduced the work overload of employees in a human resource

intensive industry.

4. This study confirmed the effects of information systems as a job resource. This was done via empirical verification of the effects of an EHR on employees in the medical services industry.
5. In hospital, using EHR decreases in work overload, employees gained time for self-development and time management, which reduced job stress and ultimately lead to job satisfaction.

References

Ahmed, U., Majid, A. H., & Lazim, M. Z. (2016). Moderation of Meaningful Work on the Relationship of Supervisor Support and Coworker Support with Work Engagement. *East Asian Journal of Business Management*, *6*(3), 15-20. Retrieved Sep 07, 2018 from http://doi.org/10.13106/eajbm.2016.vol6.no3.15

Argyris, C., & Schön, D. A. (1996). *Organizational learning II: Theory, Method, and Practice.* Addison-Wesley.

Bagozzi, R. P. (1978). Salesforce Performance and Satisfaction As a Function of Individual Difference, Interpersonal, and Situational Factors. *Journal of Marketing Research. 15*(4), 517-531. Retrieved Feb 27, 2018 from https://doi.org/10.2307/3150622

Bakker, A. B., & Demerouti, E. (2007). The Job Demands-resources Model: State of The Art. *Journal of Managerial Psychology. 22*(3), 309-328.

Bakker, A. B., Hakanen, J. J., Demerouti, E., & Xanthopoulou, D. (2007). Job Resources Boost Work Engagement, Particularly When Job Demands are High. *Journal of Educational Psychology. 99*(2), 274-284. Retrieved Nov 08, 2017 https://doi.org/10.1037/0022-0663.99.2.274

Bartel, A., Ichniowski, C., & Shaw, K. (2007). How Does Information Technology Affect Productivity? Plant-Level Comparisons of Product Innovation, Process Improvement, and Worker Skills. *The Quarterly Journal of Economics. 122*(4), 1721–1758. Retrieved Feb 27, 2018 from https://doi.org/10.1162/qjec.2007.122.4.1721

Brynjolfsson, E., & Hitt, L. M. (1998). Beyond the productivity paradox. Communications of ACM. 41(8): 49-55. Retrieved Feb 14, 2018 from https://doi.org/10.1145/280324.280332

Cappelli, P. (1996). Technology and Skill Requirements: Implications for Establishment Wage Structures. New England Economic Review. 139-156. Retrieved Sep 08, 2018 from http://www.bostonfed.org/economic/neer/neer1996/neer396h.pdf

Crawford, E. R., LePine, J. A., & Rich, B. L. (2010). Linking Job Demands and Resources to Employee Engagement and Burnout: A Theoretical Extension and Meta-analytic Test. J*ournal of Applied Psychology. 95*(5), 834-848. Retrieved Dec 11, 2017 from https://doi.org/10.1037/a0019364

Damanpour, F. (1991). Organizational Innovation: A Meta-analysis of Effects of Determinants and Moderators. *Academy of Management Journal. 34*(3) Retrieved Feb 21, 2018 from https://journals.aom.org/doi/abs/10.5465/256406?journalCode=amj

DeLone, W. H., & McLean, E. R. (1992). Information Systems Success: The Quest for the Dependent Variable. *Journal of Management Information System. 3*(4), 60-95. Retrieved Dec 11, 2017 from https://doi.org/10.1287/isre.3.1.60

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A Ten-year Update. *Journal of Management Information System. 19*(4), 9–30. Retrieved Nov 02, 2017 from https://doi.org/10.1080/07421222.2003.11045748

Dewett, T., & Jones, G. R. (2001). The Role of Information Technology in the Organization: a Review, Model, and Assessment. *Journal of Management. 27*(3), 313-346. Retrieved Nov 02, 2017 from https://doi.org/10.1016/s0149-2063(01)00094-0

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research. 18*(1), 39-50. Retrieved Nov 04, 2017 from https://doi.org/10.2307/3150979

Goodhue, D. L. (1998). Development and Measurement Validity of a Task-Technology Fit Instrument for User Evaluations of Information System. *Decision Sciences. 29*(1), 105-138. Retrieved Dec 04, 2017 from https://doi.org/10.1111/j.1540-5915.1998.tb01346.x

Grandey, A. A., Fisk, G. M., & Steiner, D. D. (2005). Must "Service with a Smile" be Stressful? The Moderating Role of Personal Control for American and French Employees. *Journal of Applied Psychology. 90*(5), 893–904. Retrieved Dec 04, 2017 from https://doi.org/10.1037/0021-9010.90.5.893 PMID: 16162062

Hochschild, A. R. (1979). Emotion Work, Feeling Rules, and Social Structure. *American Journal of Sociology. 85(*3), 551–575.

Hooper, L., Kroon, P. A., Rimm, E. B., Cohn, J. S., Harvey, I., & Le Cornu, K. A. (2008). Flavonoids, Flavonoid-rich Foods, and Cardiovascular Risk: A Meta-analysis of Randomized Controlled Trials. *American Journal of Clinical Nutrition. 88*(1), 38-50. PMID: 18614722

Iivari, J. (2005) An Empirical Test of the DeLone-McLean Model of Information System Success. *ACM SIGMIS Database. 36*(2), 8-27. Retrieved Dec 12, 2017 from https://doi.org/10.1145/1066149.1066152

Jones, M. K., Jones, R. J., Latreille, P. L., & Sloane, P. J. (2009). Training, Job Satisfaction and Workplace Performance in Britain: Evidence from WERS 2004. *Labour. 23*(1), 139-175. Retrieved Dec 28, 2017 from

https://doi.org/10.1111/j.1467-9914.2008.00434.x

Kaplan, R. S., & Norton, D. P. (1992). The Balanced Scorecard - Measures That Drive Performance. *Harvard Business Review*. *70*(1), 71–79.

Karasek, R. A. (1985). Job Content Questionnaire, Los Angeles: University of Southern California, Department of Industrial and Systems Engineering. Job Content Questionnaire

Koopmans, L., Bernaards, C. M., Hildebrandt, V. H., van Buuren, S., van der Beek, A. J., & de Vet, H. C. W. (2014). Improving the Individual Work Performance Questionnaire using Rasch analysis. *Journal of Applied Measurement, 15*(2), 160-175. Retrieved Nov 08, 2017 from DOI: 10.1136/oemed-2013-101717.51

Landsbergis, P. A., Schnall, P. L., Deitz, D., Freidman, R., & Pickering, T. (1992) The Patterning of Psychological Attributes and Distress by "Job Strain" and Social Support in a Sample of Working Men. *Journal of Behavior Medicine. 15*(4), 379-405. Retrieved Nov 08, 2017 from https://doi.org/10.1007/bf00844730 PMID: 1404353

Lee, R. T., & Ashforth, B. E. (1996). A Meta-analytic Examination of the Correlates of the Three Dimensions of Job Burnout. *The Journal of Applied Psychology. 81*(2), 123-33. Retrieved Sep 08, 2018 from http://dx.doi.org/10.1037/0021-9010.81.2.123

Marteau, T. M., & Bekker, H. (1992). The Development of a Six-item Short-form of the State Scale of the Spielberger State—Trait Anxiety Inventory (STAI). *British Journal of Clinical Psychology. 31*(3), 301–306. Retrieved Dec 12, 2017 from https://doi.org/10.1111/j.2044-8260.1992.tb00997.x PMID: 1393159

Lazim, M. Z., Ibrahim, I., & Hassan, Z. (2016). The Determinants of Human Resource Information System Success in Japanese Manufacturing Companies. *East Asian Journal of Business Management, 6*(4), 27-34. Retrieved Sep 08, 2018 from http://doi.org/10.13106/eajbm.2016.vol6.no4.27

Myers, B. L., Kappelman, L. A., & Prybutok, V. R. (1997). A Comprehensive Model for Assessing the Quality and Productivity of the Information Systems Function: Toward a Theory for Information Systems Assessment. *Information Resources Management Journal. 10*(1), 6-25. Retrieved Dec 12, 2017 from https://doi.org/10.4018/irmj.1997010101

Parker, D. F., & DeCotiis, T. A. (1983). Organizational Determinants of Job Stress. *Organizational Behavior and Human Performance. 32*(2), 160-177. doi.org/10.1016/0030-5073(83)90145-9

Peter, H. (1986). *Stress and the Nurse Manager.* New York: Wiley

Pitt, L.F., Watson, R.T., & Kavan, C.B. (1995). Service Quality: A Measure of Information Systems Effectiveness. *MIS Quarterly. 19*(2), 173-185. Retrieved Sep 08, 2018 from DOI: 10.2307/249687

Podsakoff, N. P., LePine, J. A., & LePine, M. A. (2007). Differential Challenge Stressor-Hindrance Stressor Relationships with Job Attitudes, Turnover Intentions, Turnover, and Withdrawal Behavior: A Meta-analysis. *The Journal of Applied Psychology. 92*(2), 438-454. https://doi.org/10.1037/0021-9010.92.2.438 PMID: 17371090

Ruotsalainen, J. H., Verbeek, J. H., Mariné, A., & Serra, C. (2014). Preventing occupational stress in healthcare workers. *The Cochrane Database of Systematic Reviews*. *7*(4), Art. CD002892. DOI:10.1002/14651858.CD002892.pub5.

Saunders, C. S., & Jones, J. W. (1992). Measuring Performance of the Information Systems Function. *Journal of Management Information Systems. 8*(4), 63-82. Retrieved Sep 08, 2018 from https://www.jstor.org/stable/40397998

Schaufeli, W. B., & Bakker, A. B. (2004). Job Demands, Job Resources and Their Relationship with Burnout and Engagement: A Multi-sample Study. *Journal of Organizational Behavior*. *25*(3), 293-315. Retrieved Dec 28, 2017 from https://doi.org/10.1002/job.248

Singh, J. (2000). Performance Productivity and Quality of Frontline Employees in Service Organizations. *Journal of Marketing*. *64*(2), 15-34 Retrieved Dec 28, 2017 from https://doi.org/10.1509/jmkg.64.2.15.17998

Sonnentag, S., & Zijlstra F. R. (2006). Job Characteristics and Off-job Activities as Predictors of Need for Recovery, Well-being, and Fatigue. *The Journal of Applied Psychology, 91*(2), 330-50. Retrieved Sep 08, 2018 from DOI:10.1037/0021-9010.91.2.330

Sousa, J., Cruz, A., & Martins, H. (2011). Minnesota Satisfaction Questionnaire–Propriedades Psicométricas e Validação numa População de Profissionais de. Centro Hospitalar do Porto.

Spector, P. (1997). Job Satisfaction: Application, Assessment, Causes and Consequences. California: Sage. Retrieved Sep 08, 2018 from http://dx.doi.org/10.4135/9781452231549

Venkatesh, V., & Morris, M. G. (2000). Why Don't Men Ever Stop to Ask for Directions? Gender, Social Influence, and Their Role in Technology Acceptance and Usage Behavior. *MIS Quaterly. 24*(1), 115–139. Retrieved Dec 28, 2017 from https://doi.org/10.2307/3250981

Webber, L., Smith, K., & Scott, K. (2006). Age, Work Ability and Plans to Leave Work. Australian Psychological Society Conference Proceedings, 479-483

Wheaton, B., Muthén, B., Alwin, D. F., & Summers, G. F. (1977). Assessing Reliability and Stability in Panel Models. *Sociological Methodology. 8,* 84-136. Retrieved Nov 08, 2017 https://doi.org/10.2307/270754