

Information Technology and Worker Satisfaction

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This survey brief examines the determinants of job satisfaction of U.S. workers who use computers on a regular basis. Job satisfaction has been widely researched both in terms of its determinants and its predictive power. Researchers have noted that job satisfaction is directly related to employee turnover/retention rates (Cotton and Tuttle 1986; Shore, Newton et al. 1990) and absenteeism (Scott and Taylor 1985) and indirectly to job performance and productivity although the findings for productivity have been somewhat contradictory. Research has been conducted with the general population of workers as well as within specific job types such as bank tellers (Sekaran 1989), health care workers (de Jonge and Schaufeli 1998), information systems workers (Goldstein and Rockart 1984; Igarria, Parasuraman et al. 1994), factory workers (Mullarkey, Jackson et al. 1997), and managers and professionals (Forgionne and Peters 1982; Oshagbemi 1999). In this analysis we will focus on a broad category of workers who use computers at a substantial level in their work.

We view job satisfaction as emerging from a variety of factors, including characteristics of the organizational environment, specific features of the job, and the personal characteristics of the worker. Higher job satisfaction has been linked with employees who are able to exercise autonomy (Sekaran 1989) and with those who have a higher level of job involvement (Mortimer and Lorence 1989). Women have been found to report significantly higher job satisfaction than men (Hull 1999; Sousa-Poza and Sousa-Poza 2000), although this gender gap appears to be narrowing (Rose 2005). Some researchers have noted that older workers tend to have a higher level of job satisfaction, although a number of studies have shown that the age variable might be more a proxy for experience (Janson and Martin 1982; Kalleberg and Loscocco 1983; Brush, Moch et al. 1987). Older workers also tend to be situated in higher level positions which might be more fulfilling than the less exciting entry-level positions of those just entering the work force.

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Despite the ever more pervasive presence of technology in the workplace, there have been few empirical studies of the effect of computer use on job satisfaction. For many workers, their daily activity is now highly dependent on the use of computers. For example, high levels of computer use are a feature of those who have come to be labeled as “knowledge workers,” -- namely those workers whose main tasks involve the collection, manipulation, interpretation and communication of information. Indeed, for many workers, most information regarding the organization (e.g., contact information, policies and procedures, employee benefits, etc.) is available only electronically.

Our core question is: to what extent does reliance on computers for performing one’s job affect the level of satisfaction with the job? This paper is an empirical examination of the relationship of job satisfaction with dependence on computing and information-seeking tasks by focusing on workers who currently use computers in their jobs. All of the workers in the sample use a computer for at least 5 hours per week, and many use computing very extensively in the work environment. In this report we examine conventional variables which have been found to be associated with job satisfaction and we also incorporate variables related more directly to computerization into the analysis to explore any additional effects. In particular, we assess the extent to which the computing environment, the degree of use of computing, and the degree of dependence on computing to complete job tasks are associated with job satisfaction.

Sample

This report utilizes a large sub-sample taken from a survey of 1200 individuals in twelve metropolitan statistical areas (MSAs) in the United States.² Households were selected through random digit dialing; all those within a household who were employed at least 30 hours per week and used a personal computer for at least 5 hours per week were eligible. If more than one person in the household qualified, the respondent was randomly selected from among those who

² The twelve MSAs selected were chosen to represent the more sophisticated areas of the U.S. as regards technology use (number of households with computers) and internet infrastructure (access to broadband). They are: Portland, ME, Boston, MA, Middlesex-Somerset-Hunterdon, NJ, Washington, DC-MD-VA, Raleigh-Durham-Chapel Hill, NC, Austin-San Marcos, TX, Des Moines, IA, Fort Collins-Loveland, CO, Minneapolis-St. Paul, MN, Olympia, WA, San Francisco, CA, and Orange County, CA. Within each MSA, a total of 100 respondents were interviewed (using random digit dialing techniques). The overall response rate for the survey was 42%, with MSAs varying from a low of 32% (Middlesex-Somerset-Hunterdon, NJ), to a high of 51% (Portland, ME).

qualified. The survey was conducted by telephone during the period April to July, 2004. It is a part of the larger Project POINT (People, Organizations, and Information Technology) conducted by researchers at the Center for Research on Information Technology and Organizations (CRITO) located at the University of California, Irvine. Project POINT focuses on how ICTs, especially the Internet, are transforming people's lives in the home and workplace. In this report we focus only on workers who spent at least some of their time in an office setting. Individuals who were self-employed or who worked primarily out in the field or in a home-office were excluded from the analysis. Of the 1200 respondents, 982 fulfilled these requirements.

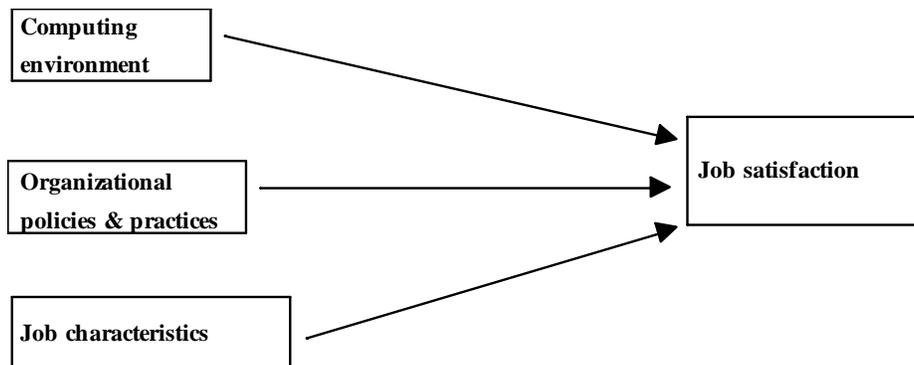
Given the sampling requirement for computer use, the respondents are, in general, more representative of white-collar workers (that is, workers engaged in non-manual labor across a wide variety of occupations), than a representation of all types of workers in the United States. In terms of gender, 45% are male and 55% are female. The average age of the respondents is 42.9 years (s.d. = 11.2) with about 4% between the ages of 18-24 and 18% aged 55 or higher. Sixty-seven percent of the respondents are college graduates and, of these, 30% also hold a graduate degree; 21% have had some college and 11% have only a high school or trade/vocational school degree. More than 27% of the respondents report a total annual household income of greater than \$100,000, while 20% report household income of less than \$50,000. About 9% work at more than one job. Most of the respondents work in large organizations, with 43% in organizations employing 1,000 or more; only about 5% work in organizations with less than 10 people. Three-quarters of the sample (77%) report working only in the office; the rest also work in the field or at home for some of the time (either telecommuting or "overtime" hours) in an average week. The respondents report working an average of 45.5 hours per week (s.d. = 9.1). Finally about two-thirds of the sample are in occupations classified as "management, professional & related" and a further 21% are engaged in "sales and office occupations."

Framework

Like Sousa-Poza and Sousa-Poza we will adopt the perspective articulated by Hulen et al. (1985) of a framework of work-role inputs and work-role outputs in understanding the determinants of job satisfaction. These researchers argue that job satisfaction depends on the balance between

inputs (education, working time, effort) and outputs (wages, status, intrinsic aspects). Thus job satisfaction occurs when work-role outputs (pleasures) increase relative to work-role inputs (pains). This framework is similar to Herzberg's job satisfaction theory which postulates that there are two dimensions: hygiene and motivation. "Hygiene" includes factors which minimize dissatisfaction, such as working conditions, company policy, salary, interpersonal relations; that is, they are conditions which do not motivate the employee but rather might limit dissatisfaction. "Motivators," on the other hand, create satisfaction by fulfilling an individual's needs, such as achievement, recognition, growth, advancement, and the work itself. For the most part, then, we can view organizational practices and policies as the work-role inputs or hygiene and characteristics of the job as the outputs or motivators. Figure 1 displays the framework for this study.

Figure 1. Organizational and Job Characteristics Associated With Job Satisfaction



Measures

Job satisfaction may be general, in the sense that it is an overall summary of affective feeling regarding one's job or it may reflect different facets of job satisfaction such as satisfaction with the types of tasks, co-workers, or pay levels, for example. In this survey brief, we focus only on the generalized, non-specific mode of job satisfaction. *Job satisfaction* is measured by the response to a single item: "Thinking about your job, on the whole, are you very satisfied, somewhat satisfied, somewhat dissatisfied or very dissatisfied." Our respondents are for the most part satisfied with their job. Almost half (48%) reported they were very satisfied and 40%

said they were somewhat satisfied with their job. Only 12% do not express satisfaction with their jobs.

Several **organizational practices** are considered important to maintaining job satisfaction. For example, programs and measures provided by the organization to enhance worker's skill and job knowledge might enhance employee job satisfaction, what Herzberg would define as 'hygiene' primarily because such organizational practices provide the bridge to the formulation of intrinsic elements connected to the job. Workers who are able to enhance their skills and to increase their job knowledge through programs and measures provided by their organizations are more satisfied with their job than those who are not provided these opportunities. We have identified four organizational practices which might enhance the overall assessment of job satisfaction as it relates to computer-using workers. First, *skill development* is a 5-point (agree to disagree) scale: "People are encouraged to develop their skills." We expect that workers who are able to improve and add to their skill set will report higher satisfaction in the job. Second, *work autonomy* is measured by the extent to which the respondent agrees with the statement "I have a lot of say over what happens in my job." while third, *work influence* is measured by the extent to which the respondent agrees with the statement "I can influence my supervisors on work-related matters." Both high levels of autonomy and influence have been consistently found to be associated with higher levels of job satisfaction. Finally, the extent to which the organization is an *information-rich environment* might add to job satisfaction. This is measured by the mean score of responses to three 5-point Likert-scaled items: 1) "I can quickly access the information that I need for work;" 2) "The information I need for my work is always available;" and 3) "The information that I need for my work is always up-to-date."

While we would not expect the presence of information systems per se to directly affect job satisfaction, the reliability and stability of the hardware and software might affect level of job satisfaction. There has been some research on workplace automation which has pointed to increases in job stress when such systems 'crash' or are so complex that it is difficult to pinpoint problems and correct them quickly (Arnetz 1997; Korunka and Zauchner 1997). At base, high emphasis on automation coupled with an unstable, unreliable computing environment resulting in high uncertainty could lead to lower levels of job satisfaction.

A measure of computer instability is constructed by summing the level of agreement with the following descriptions of organizational computing: 1) “When computers are down, my company cannot do its business;” 2) “In my company, there are too many changes in software I use;” and 3) disagreement with the statement “I can count on computer systems being ‘up’ and available when needed.”

Four indicators of **job characteristics** are used in the analysis. Similar to organizational practices and procedures, we focus on indicators which we believe are reflective of jobs in which computers are necessary for the completion of job tasks. We have identified two measures – information use and computer use. *Degree of information intensity* is measured by the mean score of three 5-point Likert scaled items: 1) “In my major work tasks I rely extensively on information;” 2) “In my major work tasks, much of my time involves interpreting information or data” and 3) “I spend a substantial amount of my time communicating or sharing information with others.” We posit that a higher score indicates that the worker is involved in the more intensive collection, processing and communication of information and that this will result in a more meaningful job for the employee. *Computer use* is measured as the number of hours a day the computer is used for work in the office.

Certain characteristics of the job, and particularly the manner in which the organization defines the job, may lead to lower levels of satisfaction. Thus we also focus on two job characteristics which reflect the intrinsic elements of the job – continuous learning and job stress. *Continuous learning* is measured by the extent to which the respondent agrees that “My job forces me to learn new things continuously.” *Job stress* is measured by the extent to which the respondent agrees that “I never seem to have enough time to get my job done.” We assume that greater job stress will negatively affect job satisfaction. However, continuous learning might add to negative pressure and stress or it might generate greater satisfaction as a factor of personal growth and job enrichment.

Finally, we include in the analysis **personal and contextual measures** which have been shown in previous research to moderate associations with job satisfaction. There is generally an assumption that age and gender might systematically relate to job satisfaction. And

organizational size is a venerable contextual variable that might associate with an aspect of work such as job satisfaction.

Findings

Table 1 provides the summary statistics (mean and standard deviation) for the variables considered in this report along with the matrix of intercorrelations. With the means generally being greater than the scale midpoints, the mean scores for the variables suggest that the organizations or those portions of the organizations represented in the sample tend to be more likely than not to have reliable, stable computing environments with information resources available, accessible and current. However, about 10% of the organizations are reported to have high computing environment instability and roughly one-quarter of the organizations experience some problems with information quality and availability. The mean score on the information-intensity of the job highlights the degree to which this sample leans more towards those whose jobs involve a high reliance on data acquisition and manipulation as part of their major tasks. Less than 10% of the sample score below the scale mid-point (3) thus indicating that the variation among the workers centers on the degree of information reliance rather than variation from no information reliance to high information reliance. On average, workers are more likely to report feelings of job autonomy and influence than not, with roughly one-quarter scoring very high (a score of 5) on these measures and only between 4-7% scoring very low (a score of 1). The extent to which employees are experiencing time pressure on the job has the highest variability with roughly equal proportions of the sample reporting very low time pressure and very high time pressure. Finally, the average number of hours of computer use per day highlights the strong presence of computers in the job tasks of the workers in the sample. Indeed nearly one-quarter of this sample reported that on average they use a computer in their work for at least 8 hours per day.

Table 2 displays the results of a multiple regression analysis with job satisfaction as the dependent variable. Three general observations seem supported. First, similar to other research, this sample of workers is more likely to have high job satisfaction where continuous learning is encouraged, the job provides a higher level of autonomy, job stress (as measured by time pressure) is not a problem, and the worker perceives he/she has influence with supervisors and

Table 1. Descriptive Elements of Study Variables: Means, Standard Deviations and Inter-correlations

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Degree information is available, accessible and up-to-date (1=low-5=high)	3.87	.81													
2. Degree organization encourages skill development (1=low – 5=high)	4.08	1.06	.30												
3. Degree of computer instability (0=low – 3=high)	.61	.66	-.18	-.10											
4. Degree job tasks are information-intensive (1=low – 5=high)	4.02	.80	.19	.16	.09										
5. Degree of continuous learning	4.06	1.11	.14	.34	-.02	.26									
6. Degree of time pressure on job	3.23	1.47	-.09	.03	.04	.15	.14								
7. Degree of work-related influence over supervisors	3.76	1.03	.21	.23	-.08	.31	.15	.05							
8. Degree of job autonomy	3.55	1.18	.23	.22	-.10	.13	.17	.05	.49						
9. Number of hours use computer in work	5.56	2.43	.07	-.03	.18	.28	.01	.01	.09	-.02					
10. Gender (1=male; -.012=female)	1.55	.50	.09	.02	-.03	.04	-.01	.05	-.01	.02	.08				
11. Age	42.91	11.22	-.01	.01	.00	-.02	-.00	.08	.00	.06	-.04	.02			
12. Total employees in company	575.97	436.26	-.04	.01	.07	.08	.06	.00	-.08	-.17	.09	-.09	.06		
13. Job satisfaction	4.21	1.03	.29	.44	-.15	.03	.21	-.11	.27	.33	-.11	.03	.02	-.11	

with work group members. However, it is also quite interesting that overall job satisfaction is negatively related to the number of hours per day that the worker uses the computer. This might indicate that when human-computer engagement becomes too dominant in one's work, relative to more direct interaction with other people, there is a decline in overall satisfaction with one's work.

Table 2. Regression of Employee Job Satisfaction

	B	S.E.	Beta	F	Sig.
(Constant)	1.885	.241		61.023	.000
<i>Organizational environment</i>					
Degree information is available, accessible and up-to-date.	.151	.038	.118	16.117	.000
Degree organization encourages skill development	.318	.029	.329	119.881	.000
<i>Computer environment</i>					
Degree of computer instability	-.061	.043	-.039	1.955	.162
<i>Job characteristics</i>					
Degree job tasks are information intensive	-.089	.039	-.070	5.114	.024
Degree of continuous learning	.065	.027	.071	5.778	.016
Degree of time pressure on job	-.081	.019	-.116	17.465	.000
<i>Power, autonomy and influence</i>					
Degree of work-related influence over supervisors	.095	.032	.096	8.789	.003
Degree of job autonomy	.159	.027	.183	33.884	.000
<i>Use of computing</i>					
Number of hours a day use computer for work in office	-.034	.012	-.079	7.701	.006
<i>Controls</i>					
Gender	.049	.056	.024	.783	.377
Age	.001	.003	.012	.197	.657
Size of organization	.000	.000	-.032	1.375	.241

R=.553; R²=.306; standard error of estimate=.859

Secondly, job satisfaction is associated with certain elements of the informational and organizational context. Satisfaction is greater in: (1) an information-rich environment – that is, in an organization in which information is available, accessible and up-to-date; and (2) in an information systems-rich environment -- that is, one in which the computer systems are reliable and software is stable. However, job satisfaction is not directly affected by technological

uncertainty, measured by the degree to which there is instability of the computer systems in the organization.

Thirdly, there are other aspects of the work and organizational setting that are not systematically associated with job satisfaction. These include the degree to which job tasks are information-intensive (also sometimes described as knowledge-work) or the type of job (for example, teacher, bank teller, sales person, etc.). Moreover, neither gender, age nor organizational size are significant contributors to the regression accounting for variation in job satisfaction.

Summary

For those involved in increasingly computer-dependent work, there is evidence here of possible negative influences on generalized job satisfaction. While job satisfaction is positively associated with feelings of autonomy and influence on the job and with coworkers, job satisfaction decreases with an increase in the number of hours the worker is directly using the computer. As one might expect, time pressures on the job also have a dampening effect on job satisfaction. This juxtaposition brings into focus the balancing of policy and practices within an organization with the intrinsic outputs of a job. In this instance, an integral part of the job of many of the workers in the sample, namely the heavy use of computer technology is associated with lower levels of job satisfaction but these can be at least partially mitigated by policy measures involving job enrichment and empowerment, which are positively associated with job satisfaction.

This is an interesting area for future research because it pinpoints a possible negative element of computer technology, namely the lowering of interpersonal interaction and the emphasis on man-machine interaction. While we can only posit that the 'reason' for the lowering of job satisfaction as higher levels of computer use occur may be the result of too little interpersonal relationships, it is an important area to explore this condition more fully, given the trend towards the notion of the virtual organization replacing the traditional brick and mortar office.

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