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TECHNOLOGICAL CAPACITATION IN CUSTOMER SERVICE WORK: A SOCIOTECHNICAL APPROACH

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Abstract

This research effort seeks to extend current understanding within the sociotechnical perspective. It investigates the inter-relationship between various aspects of both individual and technology roles in the workplace. A main focus of research is the notion of technological capacitation, the support employees derive from the use of IT systems. An analysis of survey data on the work environment of customer service representatives (CSRs) is undertaken. The study adopts a direct measure of self-assessed user performance, the customer satisfaction ability of CSRs. The findings indicate that technological capacitation is positively correlated with customer satisfaction ability. Role clarity, preparation, and supervisory support are found to be positively correlated with technological capacitation. Role conflict however, displays a negative correlation with technological capacitation. Autonomy, motivation, and influence over technology deployment are all found to be positively correlated with technological capacitation. Technology capacitation is also related positively with the user-friendliness and flexibility of technology, as well as the utility of technology performance-monitoring. However, it appears to be unrelated to independence from technology, creativity, and role involvement. The flexibility of technology and the utility of technology performance-monitoring also demonstrate positive correlations with customer satisfaction ability. Customer satisfaction ability, however, is found to be unrelated to the user-friendliness of technology. The results of this study thus highlight the coherence required between aspects of individual and technology roles for effective individual performance in the workplace.

1. INTRODUCTION

The sociotechnical systems perspective is generally recognized as being one that focuses on dimensions of work activity reflecting “the quality of work life of the individual and the extent to which the information system supports the workers in how they actually accomplish their work” (Garrity and Sanders 1998, p. 7). It may be asserted, however, that the perspective’s characteristic treatment in the past of the individual-technology relationship has biased it toward a focus on quality of work life aspects, to the neglect of studying technology support for employee work accomplishment. This may be explained as follows.

The sociotechnical approach in the past has tended to treat technology as being “exogenous” to human agency. Technology, in relation to the interests of employees, has been viewed as a displacing factor, upsetting habitual patterns of work and social relations, deskilling workers, and bringing about job routinization. This conceptual orientation of the individual-technology relationship (depicted in Figure 1), influential in previous IS sociotechnical systems work, has been driven by a deep concern over the disruptive effects of computerization on formerly familiar work environments and social structures. This orientation has been reflected in the focusing of empirical attention on the issues surrounding employee adjustment to technological change (Bostrom and Heinen 1977a, 1977b; Buchanan and Boddy 1983; Mumford 1983, 1996; Mumford and Weir 1979). This is a valid and important theoretical orientation, given the pressing problems associated with the adoption of IT systems. However, other conceptual orientations invite research attention.

The need was perceived for “endogenizing” the sociotechnical conception of technology. This involves perceiving technology as being integral to, or a close extension of, human agencies (rather than a displacer). Underlying such perception is an orientation toward viewing technology as an enabling factor in individual work activity. Such an orientation appears to have been largely

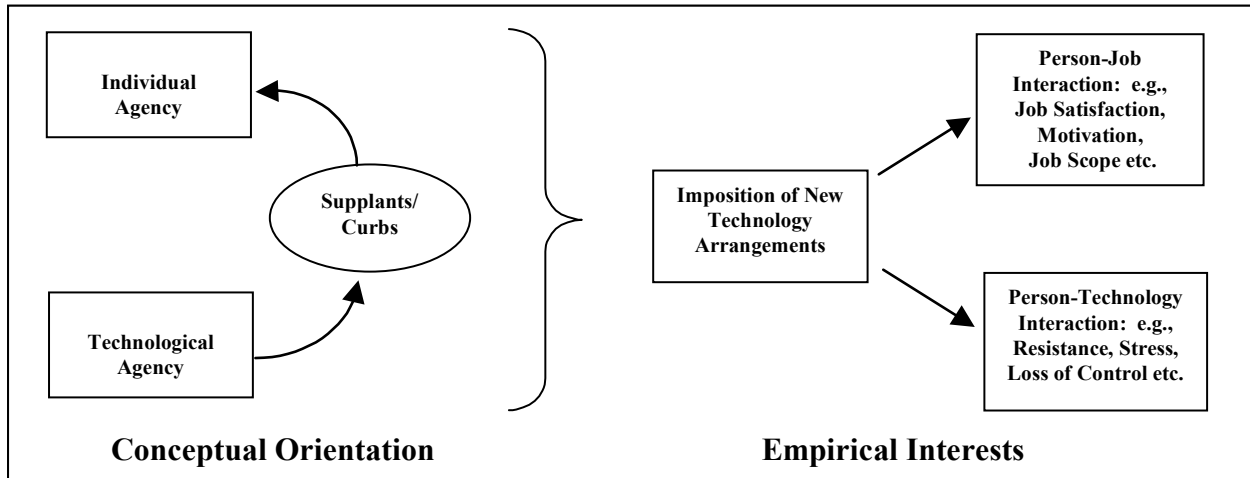


Figure 1. Technology as a Displacing Factor

missing from past IS sociotechnical systems research. It seems warranted given that the enabling ability of IT systems and tools has been underscored by previous IS research. Such technologies have been seen to be investing business practices with new reflexive processes, as well as “affording” knowledge and supporting human sense-making, through their capacity to informate and embed intelligence (Brown and Duguid 1992; Zuboff 1988).

Conceptualizing technology as an enabling factor encourages a focusing of empirical research interest on the *role* of technology in individual work activities. Technology may be perceived to take on slightly differentiated roles in different contexts of use. However, a general definition may be asserted of the primary role of technology in individual work activity, overlapping most aspects of its use. This role may be termed *capacitation*, since the assistance of an IT system essentially capacitates employee actions in certain job activities. *Technological capacitation* may thus be defined as the perceived support that individuals obtain from the use of technology systems, support that enables them to accomplish their job tasks. Such support from technology systems is invariably in the form of provision of access to numerous processing capabilities as well as information resources.

A reading of major works in the sociotechnical systems literature revealed strong significance attached by this perspective to the concept of roles in work design (Cummings and Srivasta 1977; Hirschhorn and Mokray 1992; Pasmore 1988; Trist and Bamforth 1951). Cummings and Srivasta state that roles provide “the significant link that ties humans to technology in workplace activity” (p. 86). Individual work roles provide the context within which human agencies are expressed and directed, and work performance achieved (Hirschhorn and Mokray 1992). The significance of the notion of role in the sociotechnical perspective thus recommends its use as an anchoring concept for studying the relationship between individual work behavior and technology capacitation.

In spite of this significance however, the notion of roles appears to have received inadequate attention in past sociotechnical research. In contrast, individual roles in a variety of contexts have been the focus of a substantial body of research in the organizational studies field under the designation of role theory (Biddle 1979; Biddle and Thomas 1966). Examples of important aspects of roles that have been studied include role ambiguity (or its opposite, role clarity) and role conflict (Van Sell et al. 1981). Role theory has also been adopted for use in IS research in a small number of past research efforts. These include studies on IS development practices, and the work attitudes of IS personnel (Baroudi 1985; Bostrom 1980; Galletta and Heckman 1990), as well as studies on individual employee attitude toward the adoption of new IT systems (Counte et al. 1984; Nelson and White 1988). However, there seems to have been insufficient effort put into studying the interrelationship between individual work behavior and technology use in terms of role-related aspects.

This study thus undertook the opportunity to extend the application of the sociotechnical systems perspective by studying technology as an enabling factor, using the theoretical understanding afforded by role theory. Figure 2 depicts this sociotechnical orientation. The support provided by technology, or technological capacitation, formed a central focus of this study. The study carried out its investigations within the environment of customer service work. This particular environment was seen as providing a pertinent context for studying the relationship between aspects of individual role and technology usage. This was due to the perception of unique role-related conditions in the nature of such work activity, as well as the significant use of IT systems in such environments. Customer service representative (CSRs) spend a substantial amount of their time and energy dealing directly with

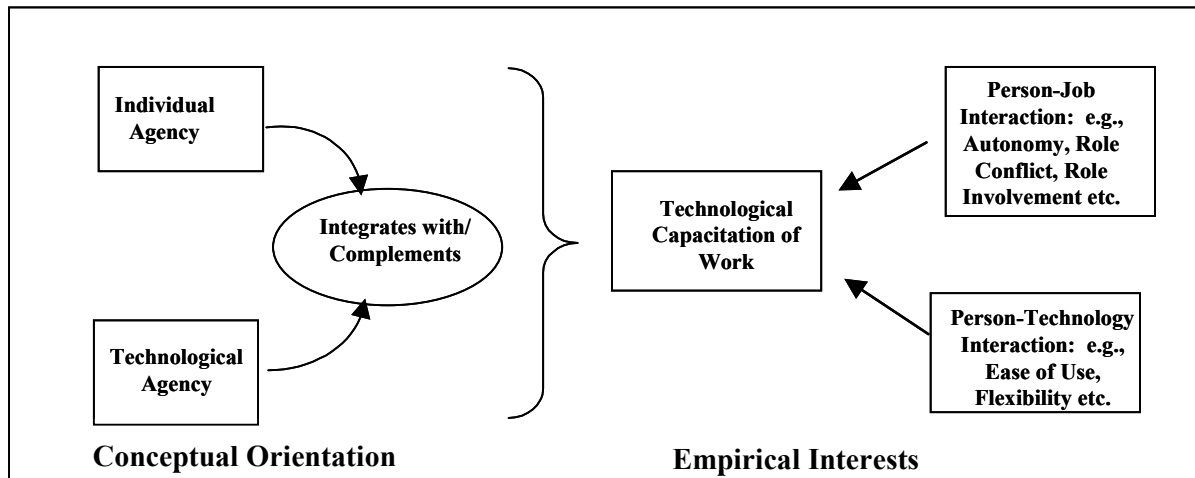


Figure 2. Technology as an Enabling Factor

customer requests. The roles they undertake may be said to be caught between two lines of reference: satisfying the expectations of management they work for and the expectations of the customers they serve. These expectations, incumbent on CSR work roles, were seen to offer an interesting context for studying the interaction of work behavior with IT usage.

2. INDIVIDUAL ROLE AND TECHNOLOGY USAGE

This section sets out to define several aspects of individual roles and features of technology usage that formed the focus of investigation in this study. A role may be defined as a set of expectations or behaviors characteristic of a certain position in a social structure (Biddle 1979; Rizzo et al. 1970). In the context of CSR work, aspects of individual work roles that may be associated with technological capacitation include role conflict, role clarity, role involvement, role preparation, and role supervisory support. Role conflict occurs when there is a dissensus or incompatibility between expectations associated with a role (Rizzo et al. 1970). The resulting psychological conflict experienced by the role bearer has been shown by numerous studies to be dysfunctional to work performance, evoking negative outcomes like job dissatisfaction and tension (Nelson and White 1988; Van Sell et al. 1981).

Role clarity (or its opposite counterpart, role ambiguity) is another role-related concept that has been much studied in organizational contexts (Miles 1970). Role clarity arises when clear information exists regarding both role expectations and the means to fulfil such expectations (Galletta and Heckman 1990). The lack of role clarity, or increased role ambiguity, has been linked to lower productivity outcomes and higher levels of anxiety and tension (Nelson and White 1988; Rizzo et al. 1970; Van Sell et al. 1981). Role involvement refers to the degree to which a worker invests effort, or is positively engaged, in the performance of a role (Biddle 1979). Role preparation refers to the formal and informal training a worker is provided in the performance of his role. Role supervisory support is one of the aspects of the interpersonal climate that surrounds an employee holding a role (Van Sell et al. 1981). The supervisor is typically a key source (or role-sender) of the role expectations experienced by employees. The guidance and information provided by a supervisor can be instrumental in helping the employee fulfil his role.

Several aspects of individual agency, such as creativity, autonomy, and motivation, are related to the roles assumed by individuals in organizations (Stryker and Statham 1985). Creativity, or the ability to come up with new ideas and ways of doing things, has been asserted to be a significant aspect of individual work performance (Quinn 1992). Autonomy refers to the degree of self-influence felt by employees in shaping the conditions of their work. Motivation refers to the extent to which employees feel congruent with the behaviors required for the successful accomplishment of their work. In the sociotechnical perspective, both autonomy and motivation have been asserted to be key determinants of individual performance (Mumford 1993; Pasmore 1988; Yeatts and Hyten 1998). A related aspect of autonomy, but one narrowly focused within the context of employee interactions with technology systems, is the influence employees possess over the deployment of technology. This covers decisions regarding the use of new technology or the replacement of existing equipment.

Aspects of technology usage that may be associated with the accomplishment of individual roles in the context of CSR work include user-friendliness, flexibility, independence (from too much control by technology), and the utility of performance-

monitoring data generated by technology systems. User-friendliness refers to the ease of use of technology systems. Flexibility refers to the extent that IT systems permit employees to make adjustments to processing functions in order to meet unique contextual needs. Such adaptability in technology is strongly favored in the sociotechnical approach (Pasmore 1988). Independence from technology refers to the degree to which the use of technology does not rigidly control, or predispose, the way employees carry out their work. Such control might extend to such aspects of work activity as the sequencing of work, the pace of work, and the designation of access rights to processing or information sources. Another subtle aspect of control is the degree of reliance that the use of a technology exerts on a worker. Too great a reliance on technology may impede employees from exercising the initiative called for in certain contexts. The utility of performance-monitoring refers to the extent to which computer-generated data on employee activities is perceived to be useful to employees as an aid for improving their performance.

3. METHODOLOGY

3.1 *Research Aims and Approach*

In line with the research potential described in the introductory section, this study set out to investigate the interrelationship between individual work behavior and IT usage in the context of customer service work. The particular aims of the research were encompassed by the questions:

- How are role-related aspects of individual behavior and technology usage factors associated with technological capacitation of CSR work?
- How are technology usage factors associated with customer satisfaction ability in CSR work?
- What is the impact of technological capacitation on individual customer satisfaction ability?

A quantitative approach to answering these questions, involving the statistical analysis of survey data, was selected after due consideration. Role performance and interactions with technology represent complex facets of employee experiences. Thus a qualitative approach might be seen as a more useful data-gathering strategy. However, significant value was perceived in adopting a quantitative approach. Previous sociotechnical research has largely consisted of the use of action methods, involving direct researcher intervention in workplace activities. This has made it difficult to define the inter-relationships between work factors or variables, hampering efforts to formulate general guidelines for improving work performance (Fincham and Rhodes 1992; Kelley 1982). It was thus anticipated that a quantitative approach would be beneficial in providing a certain measure of precision and generalizability, as well as an indication of the proportional significance of relationships between different workplace factors.

3.2 *Source of Data*

The data analyzed in this study came from a secondary source. It was obtained from a data set, produced by an international study of service-oriented employees from highly-ranked companies in the banking and telecommunications industries of the USA, Australia, and Japan (Frenkel et al. 1998).¹ That international study collected data on over 200 job-related variables covering the organization and management of skilled work, and gathered just under 1,100 completed responses. The data set was adopted for use in this research for several reasons. First, it included variables of direct interest to this study. Second, a significant degree of potential was perceived for further deriving original analysis and implications from the data set, entirely distinct from the valuable contributions made by the authors of the previous study in associated publications (Frenkel et al. 1999; Korczynski et al. 1996). Finally, an extensive subset of the respondents to the survey were CSRs. This afforded access to a significantly large sample size of relevant data (N = 603). Only this subset of the data was analyzed in this study.

The CSRs in this sample came from 10 different work sites in the USA, Australia, and Japan. In drawing its data from firms operating in different countries, this study focused on identifying regularities in employee perceptions across different organizational environments. It was not about contrasting employee perceptions across different organizational settings. Nevertheless, an important methodological consideration is raised by the different national and socio-cultural contexts from which the surveyed workers came. The unique social norms and cultural dispositions prevailing at particular work sites increase the

¹The author gratefully acknowledges the assistance of Frenkel et al. (1998) and the Social Science Data Archives at The Australian National University, Canberra, Australia, in providing access to the data that was used for empirical analysis in this study. Those who carried out the original collection and analysis of the data bear no responsibility for this further analysis or interpretation.

potential for bias in the attitudinal perceptions of survey respondents. Such bias could interfere with the validity of a study. Turner (1984) asserts that one strategy for counteracting such bias in research efforts is to have a sufficient number of different work groups in the sample, in order to increase the degree of random occurrence of any particular perception. Thus, the large number of different originating work sites in this study's sample was seen as an appropriate measure for reducing the effects of contextual bias.

3.3 Measurement

The study variables were formed from selected questionnaire items in the data set (Frenkel et al. 1998). Item responses had involved ordinal ranked choices along a five-point scale (e.g. disagree strongly, disagree somewhat, neither agree nor disagree, agree somewhat, agree strongly). Exploratory factor analysis, using the principal components method, was conducted to help identify the variables. The composition of the various variables, and their associated reliability scores, can be seen in Table A1 in the Appendix. The variables corresponded to concepts defined in the earlier section of this paper. For the sake of brevity, the variables technological capacitation and self-assessed customer satisfaction ability will be abbreviated to TC and SCSA respectively, in the upcoming discussion.

4. FINDINGS

4.1 Demographics

The sample of CSRs consisted of more female than male workers, with female employees constituting 76% of the total number of respondents. Regarding employment status, 80% of the CSRs were full-time employees, while the remainder were part-time workers. Each CSR averaged one and a half years of working in their present job. The CSRs all worked at call centers, typically open-plan offices with cubicles for each worker (Frenkel et al. 1999). Each of these call centers had an average of 112 workers on-site.

The CSRs were divided into teams, but typically worked individually in dealing with customers, although they were at liberty to consult colleagues and supervisors for assistance. They spent a substantial percentage of their work time ($M = 86.6$) speaking with customers, typically over the phone, processing customer queries and transactions. The duties of some CSRs also involved making sales pitches for new services provided by their companies. The CSRs were all equipped with networked computer systems, which they worked on for a majority percentage of their office time ($M = 93.3$). They utilized these systems for recording, checking and retrieving information, and for carrying out searches of databases at their company or associated company sites.

4.2 Initial Assessment of Technology Usage

The relationships between technological capacitation and various study variables were first investigated through a test of group differences. Respondents were assigned to one of three ranked groups of technological capacitation (TC) based on their respective factored scores in this variable. These three groups were low TC, moderate TC, and strong TC.

Not all the data from the different study variables met the parametric assumption of normal distribution. Hence, a Kruskal-Wallis one-way ANOVA was performed to test for differences in the group means of different variable scores. The test results indicated that there were significant differences between the means of TC groups for several of the study variables. Consequently, a test of association between these variables was conducted using Pearson's product moment correlation test. The results of that analysis will be described in the next section. First, however, we will discuss those variables that did not evince any mean group differences in the Kruskal-Wallis test.

The test results indicated that there were no significant group differences in terms of the value CSRs placed upon technology (Chi-square (2) = 4.73, $p = 0.094$). This was an important finding. It suggested that differences in the self-reported degree of TC were not biased by any serious differences in individual valuation of the role played by technology. This result lent support for the validity of subsequent analytical assessments. An examination of responses to the measurement item revealed that the majority of CSRs placed a strong premium on having appropriate and reliable technology support, with 53% agreeing that having good technology to work with was "very important" and 41% indicating that it was "important."

No significant group differences were found either in terms of irregularity, or non-routineness, in CSR task environments (Chi-square (2) = 2.18, $p = 0.336$). Such irregularity referred to the frequency of occurrence of unanticipated or unique situations in work activity. This result suggested that the lower levels of support experienced by CSRs in the low and moderate TC groups were not due to the effectiveness of this support being undermined by a greater occurrence of uncommon events. This did not correspond, however, with a previous finding by Kraut et al. (1989). Their study found that the effective use of computers in a customer service environment was curtailed by extraordinary, non-routine work. There were no significant group differences in terms of role involvement (Chi-square (2) = 6.16, $p = 0.05$). This suggests that stronger TC is not a spur for greater commitment of employee effort. TC did not appear to be a differentiating factor either with regard to the amount of creativity expressed by CSRs in their work. The absence of significant group differences (Chi-square (2) = 0.73, $p = 0.620$) suggested that individual inventiveness in problem-solving was not related to the level of TC. Finally, there were also no significant group differences in mean scores of independence from technology (Chi-square (2) = 3.52, $p = 0.172$). This implied that the amount of control exerted by technology over work tasks was unrelated to TC levels.

In the study’s preliminary analysis of its data, suggestive evidence emerged of the connection between work organization and TC. This came from the responses to a survey item that sought an indication of the perceived source of problems in providing customer service. The percentage responses across the three groups of TC are shown in Table 1. A trend is apparent in the responses concerning problems originating from work organization. Many more CSRs in the low TC group were experiencing such problems, compared to those in the moderate TC and strong TC groups. Higher levels of TC appeared to be associated with less problems in work organization. From this, it may be inferred that good or appropriate work organization practices are necessary for achieving strong technological capacitation.

Table 1. The Origin of Customer Service Problems

Regarding problems in providing customer service, is this due to:		Technological Capacitation (TC)		
		Low	Moderate	Strong
[1] the way work is organized here?	% Yes:	61	57	35
	% No:	39	43	65
[2] you not having enough skills and experience?	% Yes:	28	33	20
	% No:	72	67	80
[3] customers’ expectations being too high?	% Yes:	65	83	71
	% No:	35	17	29

Note: Actual number of respondents for [1]: Low - 135, Moderate - 102, Strong - 161; [2]: Low - 135, Moderate - 102, Strong - 162; [3]: Low - 140, Moderate - 105, Strong - 165.

4.3 Inter-Relationships in CSR Work

The Pearson’s product moment correlation test was used to measure the association between study variables. The full results are shown in Table A2 in the Appendix. Owing to space limitations, not all of the findings will be discussed. Only relationships of primary interest, reproduced for convenience in Table 2, will be treated.

Various aspects of individual role and technology usage were studied in terms of their relationship with TC. As seen in Table 2, a positive association, of weak to moderate strength, was found between TC and role clarity ($r = 0.20, p < 0.001$). One possibility of interpreting this apparent relationship draws on the premise that technology systems are built to support individual roles. Hence, a greater sense of clarity in employees regarding their expected work roles may facilitate a greater sense of congruence with the support provided by technology, leading to higher perceptions of TC. This needs to be researched further, however, since the proper interpretation of this relationship is not immediately apparent. Role conflict displayed a weak negative association with TC ($r = -0.15, p < 0.001$). This suggested that situations which evoke dissensus in the role expectations held by an individual will have a modestly deleterious effect on the perceived effectiveness of IT support. Role supervisory support displayed a weak, positive correlation with TC ($r = 0.16, p < 0.001$).

Table 2. Correlations Between Selected Variables and (1) TC; (2) SCSA

Variables	Technological Capacitation (TC)	Self-Assessed Customer Satisfaction Ability (SCSA)
(Role-related variables)	-	-
Role clarity	0.20***	0.23***
Role conflict	-0.15***	-0.43***
Role involvement	-0.09	0.22***
Role preparation	0.38***	0.26***
Role supervisory support	0.16***	0.15***
Autonomy	0.16***	0.10*
Creativity	0.02	0.16***
Motivation	0.18***	0.23***
Influence over technology deployment	0.11**	0.09
(Technology usage variables)	-	-
User-friendliness of technology	0.41***	0.07
Flexibility of technology	0.30***	0.16***
Independence from technology	0.01	0.07
Technology performance-monitoring utility	0.28***	0.15**

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Role preparation was found to be strongly associated with TC ($r = 0.38, p < 0.001$). Since this variable had been measured by several items addressing different type of training provisions, further tests were conducted to assess the impact of each type of training. TC was found to be associated, in respective order of strength, with training in technology systems ($r = 0.47, p < 0.001$), company procedures ($r = 0.31, p < 0.001$), teamwork and problem-solving skills ($r = 0.20, p < 0.001$), and finally, customer service skills ($r = 0.16, p < 0.001$).

A weak, positive association was discovered between motivation and TC ($r = 0.18, p < 0.001$). This tentatively suggests that lower TC may have a slightly detrimental effect on motivation. Autonomy was found to be weakly correlated with TC ($r = 0.16, p < 0.001$). Influence over technology deployment also evinced a weak positive association with TC ($r = 0.11, p < 0.01$). Additionally, autonomy was found to be strongly correlated to influence over technology deployment ($r = 0.46, p < 0.001$). Together, these three findings suggest that (1) the self-influence of CSRs in terms of organizing their work activities is, to an eminent extent, commensurate with self-influence over decisions regarding the deployment of technology, and (2) greater self-influence by CSRs over their work organization and the implementation of IT tools could facilitate a slightly higher level of perceived TC. A review of the item responses regarding influence over technology deployment revealed that, in reality, the actual influence possessed overall was marginal. This was true both for the influence CSRs had in decisions to replace the technology they were working with (72% said “none at all”; 19%, “very little”), as well as the influence they had in deciding how to work with new software (69% said “none at all”; 21%, “very little”).

The relationships between various features of technology usage and TC were inspected. The user-friendliness of technology and flexibility of technology produced strong, positive correlations with TC. This underscored their importance in facilitating the effective role of technology. Consistent with the earlier Kruskal-Wallis test result, TC was found to be uncorrelated with independence from technology. The utility of technology performance-monitoring, in contrast, evinced a moderate correlation with TC ($r = 0.28, p < 0.001$). This suggested that, within the context of CSR work, good use of the “informating” ability of technology contributes favorably to the perception of technology as an enabling factor. The relationships between various aspects

of technology usage and CSR customer satisfaction ability were also examined. Unexpectedly, in contrast to its strong association with TC, user-friendliness of technology was found to be unrelated to SCSA ($r = 0.07, p = 0.094$). Flexibility of technology, on the other hand, displayed a weak, positive relationship with SCSA ($r = 0.16, p < 0.001$). SCSA was seen to be unrelated to independence from technology. Technology performance-monitoring utility was found to be weakly correlated with SCSA ($r = 0.15, p < 0.01$). This suggested that the effective use of computer performance-generated data was modestly facilitative of better customer satisfaction ability.

TC was found to have a weak to moderate association with self-assessed customer service ability ($r = 0.23, p < 0.001$). Confidence limits produced by the correlation test indicated a 95% confidence that in the population, r would be between 0.15 and 0.31. The results also indicated that 5% of the variation in self-assessed customer service ability were accounted for by the variation in TC. Thus, an increase in the level of TC appears to enable a modest increase in CSR customer service ability. The positive linkage between IT use and increased employee performance is concordant with the findings of past studies (Guttek et al. 1984; Kraut et al. 1989; Turner 1984).

5. DISCUSSION OF FINDINGS

The inter-relationship between aspects of individual and technology roles in CSR work accomplishment was revealed. Technological capacitation, the primary role of technology, displayed a modest but positive impact on CSR customer satisfaction ability. Role clarity, role preparation, and role supervisory support were found to be positively associated with technological capacitation. Role conflict, however, was negatively correlated with technological capacitation. Autonomy and motivation displayed positive correlations with technological capacitation. A similar association was discovered between the latter and influence over technology deployment. The user-friendliness and flexibility of technology, as well as technology performance-monitoring utility, were all found to be positively linked with technological capacitation. However, technological capacitation was found to be unrelated to independence from technology. Flexibility of technology and the utility of technology performance-monitoring demonstrated positive associations with customer satisfaction ability.

The negative association discovered between role conflict and technological capacitation requires further study, since the nature of their relationship does not appear to be immediately apparent. One possibility for the association has to do with the premise that the manner in which technology systems are designed to operate typically reflect the role-expectations of management. Hence, in situations where CSRs experience conflict between management and customer expectations, the technology systems may be seen by them to contribute to such conflict. This would result in a devaluation of the level of perceived technological capacitation. A focus of future research could thus involve ascertaining how role-expectations are inscribed into the operations of a technology system, and in what way these are capable of creating role conflict in users.

It appears that higher levels of perceived capacitation by technology systems, although modestly facilitative of increases in CSR customer satisfaction ability, did not provide a stimulus for greater creativity on their part. Increased technological capacitation also did not appear to encourage greater investment of effort (i.e., role involvement) among CSRs. These findings carry a rejection of deterministic assumptions that increasing the sophistication of technological support can bring about a flourishing of effectiveness in all aspects of human agency. Other findings of the study, however, do emphasize the importance of adequate training, and the flow of appropriate information and guidance from supervisory staff, for promoting the ability of individual employees to make more effective use of technology. This was suggested by the positive association of role preparation, role clarity, and role supervisory support with technological capacitation.

Previous sociotechnical studies have strongly advocated that organizations invest their employees with greater influence over technology deployment. Such influence, in the form of explicit participation in the design activities of new computerization projects, has been seen as a significant prerequisite for the successful implementation of such projects (Land and Hirschheim 1983; Mumford 1993; Mumford and Weir 1979). The weak association found in this study between influence over technology deployment and technological capacitation provides a measure of support for this traditional sociotechnical assertion. However, while influence over technology deployment may be useful in helping employees adjust to new technology, the modest magnitude of its correlation with technological capacitation identified by this study suggests that such influence is only narrowly facilitative of better operational levels of technology support.

Since the user-friendliness of technology had shown a much stronger degree of correlation with technological capacitation than the flexibility of technology, its lack of a significant relationship with customer satisfaction ability was somewhat surprising. However, it may be considered that the lack of user-friendliness in technology, while possibly slowing down customer service efforts, is unlikely to seriously obstruct such efforts. This could account for the lack of any relationship between user-friendliness and customer satisfaction ability. On the other hand, the lack of flexibility of technology appears to be a much more damaging

condition. Attempts at making the necessary technology adjustments required for coping with particular service requirements may be frustrated, leading to a reduction in customer satisfaction ability. Hence, this study's findings suggest that flexibility of technology is a very important aspect for consideration by developers and managers. If technology systems are to play an integral role in human agency, then tractability in such systems is required to effectively facilitate the discretion required of employee action in certain contexts. It may be helpful for managers to evaluate their existing IT systems in terms of their "behavioral scalability." By this is meant the degree of versatility of IT systems to accommodate an extended range of alternative actions, to match changing role requirements.

6. CONCLUSION

This study set out to extend the sociotechnical approach. Viewing technology as an enabling factor, it sought to investigate the inter-relationship between aspects of both individual and technology roles. It was distinguished by its use of a direct measure of self-assessed user performance, instead of the indirect, "surrogate" measures (e.g., job satisfaction) characteristic of past sociotechnical research (Swanson 1987). The findings provide a preliminary framework of understanding for attaining a more effective integration of technology into individual work practices. The findings also extend those of previous IS studies on role-related aspects in the area of individual IT use (Counte 1984; Nelson and White 1988). On the whole, the results of this study suggest that achieving an effective coherence between human and technological agencies in the workplace requires paying close attention to the inter-relation of aspects of individual and technology roles. In role theory, a system is considered to be "role-integrated" when its constituent roles correspond well together (Biddle 1979). It may be asserted that, in the light of the associations revealed by this study, a sociotechnical approach is vital for achieving effective role-integration in individual work activity systems.

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Appendix

Table A1. Definition of Research Variables: Items, Descriptive Statistics and Reliability

Variable	Measurement Items [M, SD]	Reliability (Cronbach's Alpha)
(SCSA) Self-assessed customer satisfaction ability	How often do you feel that { 1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often } <ul style="list-style-type: none"> • you cannot satisfy customer's requirements (reverse coded) [3.20, 0.83] • you are not confident about your ability to satisfy customers (reverse coded) [3.85, 0.87] • you are not making customers happy (reverse coded) [3.69, 0.77] 	0.72
(TC) Technological capacitation	The technology I usually work with { 1 = strongly disagree, 2 = disagree somewhat, 3 = neither disagree nor agree, 4 = agree somewhat, 5 = strongly agree } <ul style="list-style-type: none"> • enables me to do my job effectively [4.19, 0.92] • restricts my ability to satisfy customer needs (reverse coded) [3.21, 1.26] How satisfied are you with the technology you work with { 1 = very dissatisfied, 2 = dissatisfied, 3 = neither dissatisfied nor satisfied, 4 = satisfied, 5 = strongly satisfied } [3.26, 1.01]	0.87
Autonomy	How much direct influence and involvement do you have in each of the following { 1 = none at all, 2 = very little, 3 = some amount, 4 = a fair amount, 5 = a lot } <ul style="list-style-type: none"> • deciding how to do your job and organize the work [3.40, 1.20] • setting work schedules, including breaks, overtime and time off [2.03, 1.19] • setting goals for your team or section [1.97, 1.10] • deciding what training is needed for your team or section [1.99, 0.99] 	0.76
Creativity	In your work, how often do you { 1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often } <ul style="list-style-type: none"> • try out new ways to solve problems [3.53, 0.95] • come up with new ways and ideas of doing things [3.25, 0.98] • deal with non-routine or unique problems [3.48, 0.99] 	0.81
Motivation	Thinking about your current work, how much do you agree or disagree with the following { 1 = strongly disagree, 2 = disagree somewhat, 3 = neither disagree nor agree, 4 = agree somewhat, 5 = strongly agree } <ul style="list-style-type: none"> • I feel a sense of personal satisfaction when I do this job well [4.35, 0.72] • I take pride in doing this job as well as I can [4.39, 0.69] • my opinion of myself goes up when I do this job well [4.24, 0.81] 	0.81
Influence over technology deployment	How much direct influence and involvement do you have in each of the following { 1 = none at all, 2 = very little, 3 = some amount, 4 = a fair amount, 5 = a lot } <ul style="list-style-type: none"> • deciding how to work with new equipment or software if that's ever been needed [1.45, 0.80] • deciding about replacement of equipment you work with or new technology [1.39, 0.72] 	0.89
Role clarity	How much do you agree or disagree that in doing your work { 1 = strongly disagree, 2 = disagree somewhat, 3 = neither disagree nor agree, 4 = agree somewhat, 5 = strongly agree } <ul style="list-style-type: none"> • you know exactly what your duties are [4.58, 0.58] • you know exactly what is expected of you by your supervisor / manager [4.48, 0.72] • you receive clear explanations about what has to be done [4.16, 0.93] 	0.82
Role conflict	In providing customer service or selling company products/services, how often do you { 1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often } <ul style="list-style-type: none"> • receive incompatible requests from customers and management [2.88, 0.83] • feel that management's expectations hinder you in giving good customer service [2.58, 1.07] • do things that are acceptable to management but not acceptable to customers [2.53, 1.02] 	0.70

Variable	Measurement Items [M, SD]	Reliability (Cronbach's Alpha)
Role involvement	In your work, how often do you { 1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often } <ul style="list-style-type: none"> • go beyond the scope of your duties when necessary [3.70, 0.97] • do more than the acceptable level [3.79, 0.89] • put in extra effort [3.96, 0.84] 	0.88
Role preparation	How satisfied or dissatisfied have you been with the knowledge and skills provided in the following areas: { 1 = very dissatisfied, 2 = dissatisfied, 3 = neither dissatisfied nor satisfied, 4 = satisfied, 5 = strongly satisfied } <ul style="list-style-type: none"> • company procedures, products or services [3.63, 0.86] • customer service and sales [3.90, 0.83] • technology and systems [3.50, 0.97] • teamwork and problem-solving [3.77, 0.94] 	0.74
Role supervisory support	How much do you agree or disagree that your immediate supervisor { 1 = none at all, 2 = very little, 3 = some amount, 4 = a fair amount, 5 = a lot } <ul style="list-style-type: none"> • keeps you informed [4.00, 1.02] • gives recognition for a job well done [3.95, 1.06] • helps you develop your skills [3.75, 1.16] • encourages you to participate in important decisions [3.51, 1.19] 	0.86
User-friendliness of technology	The technology I usually work with is user-friendly { 1 = strongly disagree, 2 = disagree somewhat, 3 = neither disagree nor agree, 4 = agree somewhat, 5 = strongly agree } [2.69, 1.23]	-
Flexibility of technology	The technology I usually work with is flexible enough for me to make adjustments to suit my needs { 1 = strongly disagree, 2 = disagree somewhat, 3 = neither disagree nor agree, 4 = agree somewhat, 5 = strongly agree } [2.87, 1.08]	-
Independence from technology	The technology I usually work with { 1 = strongly disagree, 2 = disagree somewhat, 3 = neither disagree nor agree, 4 = agree somewhat, 5 = strongly agree } <ul style="list-style-type: none"> • controls the way I work (reverse coded) [1.99, 1.01] • makes me feel too reliant on it (reverse coded) [2.70, 1.17] 	0.55
Technology performance-monitoring utility	Information generated by the technology { 1 = strongly disagree, 2 = disagree somewhat, 3 = neither disagree nor agree, 4 = agree somewhat, 5 = strongly agree } <ul style="list-style-type: none"> • is used in a way that helps me do my job better [3.57, 1.09] • covers all important aspects of my work performance [3.17, 1.24] • is a key measure of my work performance [3.87, 1.06] • is made available to me as often as I need it [3.74, 1.11] 	0.73
Irregularity in task environment	In your work, how often do you deal with non-routine or unique problems { 1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often } [3.48, 0.99]	-
Value placed upon technology	When you think of your working life, how important is good technology to work with { 1 = not important at all, 2 = not important, 3 = neither important nor unimportant, 4 = important, 5 = very important } [4.47, 0.62]	-
Origin of customer service problems	Regarding problems in providing customer service, is this due to: { Yes, No } <ul style="list-style-type: none"> • the way work is organized here? • you not having enough skills and experience? • customers' expectations being too high? 	-

Note: Responses to a few indicated measurement-items had been reverse-coded by Frenkel and his colleagues in their preparation of the data set (Frenkel et al. 1998). This had been done in order to reverse the negative direction of the wording in those items, so that they lined up in interpretation with the positive direction of the rest of the questionnaire-items. All responses were thus scaled from negative to positive, or low to high.

Table A2. Intercorrelations among Selected Study Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Self-assessed customer satisfaction ability	–													
2. Technological capacitation	0.23 ^{***}	–												
3. Role clarity	0.23 ^{***}	0.20 ^{***}	–											
4. Role conflict	-0.43 ^{***}	-0.15 ^{***}	-0.14 ^{**}	–										
5. Role involvement	0.22 ^{***}	-0.09	0.17 ^{***}	-0.05	–									
6. Role preparation	0.26 ^{***}	0.38 ^{***}	0.34 ^{***}	-0.25 ^{***}	0.25 ^{***}	–								
7. Role supervisory support	0.15 ^{***}	0.16 ^{***}	0.34 ^{***}	-0.12 ^{**}	0.04	0.31 ^{***}	–							
8. Autonomy	0.10 [*]	0.16 ^{***}	0.11 ^{**}	-0.02	0.17 ^{***}	0.20 ^{***}	0.16 ^{***}	–						
9. Creativity	0.16 ^{***}	0.02	0.09 [*]	-0.02	0.48 ^{***}	0.20 ^{***}	0.09 [*]	0.22 ^{***}	–					
10. Motivation	0.23 ^{***}	0.18 ^{***}	0.32 ^{***}	-0.17 ^{***}	0.45 ^{***}	0.37 ^{***}	0.19 ^{***}	0.10 ^{**}	0.32 ^{***}	–				
11. Influence over technology deployment	0.09	0.11 ^{**}	0.08	0.02	0.18 ^{***}	0.13 ^{**}	0.13 ^{**}	0.46 ^{***}	0.22 ^{***}	0.08	–			
12. User-friendliness of technology	0.07	0.41 ^{***}	0.11 ^{**}	-0.11 ^{**}	-0.02	0.20 ^{***}	0.13 ^{**}	0.08	-0.01	0.14 ^{**}	0.08	–		
13. Flexibility of technology	0.16 ^{***}	0.30 ^{***}	0.14 ^{***}	-0.05	0.08	0.21 ^{***}	0.11 ^{**}	0.10 [*]	0.13 ^{**}	0.18 ^{***}	0.20 ^{***}	0.11 ^{**}	–	
14. Independence from technology	0.07	0.01	0.05	-0.11 ^{**}	-0.04	0.02	-0.06	0.11 ^{**}	0.07	-0.04	0.10 [*]	0.11 ^{**}	0.06	–
15. Technology performance-monitoring utility	0.15 ^{**}	0.28 ^{***}	0.19 ^{***}	-0.16 ^{***}	0.01	0.30 ^{***}	0.17 ^{**}	0.06	0.07	0.13 ^{**}	0.08	0.19 ^{***}	0.33 ^{***}	-0.02

* p < 0.05, ** p < 0.01, *** p < 0.001