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Exploring the Role of Information Technology in Organizational Downsizing: A Tale of Two American Cities

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Abstract

This study explores the role information technology (IT) plays in organizational downsizing by studying two medium-sized American cities over a period of 10 years (1985–1995). Data were collected through 73 interviews, a questionnaire, and numerous documents. Four main findings emerged from the case studies. First, IT was found to facilitate organizational downsizing, but not to cause it. New City invested heavily in state-of-the-art IT over the years and more successfully downsized the organization than Old City, which lagged behind in IT investment and made no serious attempts to use IT as a tool to support strategic actions. Second, adverse environmental conditions triggered downsizing in both cities and determined the change strategies that managers used. When environmental pressures were mild (1985–1990), managers favored a convergent change strategy that resulted in limited downsizing efforts and small personnel reductions. In contrast, when environmental pressures were strong (1990–1995), managers of both cities engaged in strategic reorientation and in downsizing efforts that led to larger personnel reductions. Third, the role IT played in organizational downsizing varied according to the change strategy. IT was used to facilitate work redesign in a convergent change strategy and to facilitate more significant structural and work redesign in strategic reorientation. Fourth, more integrated and better use of IT allowed managers of New City to downsize more rationally and efficiently. It facilitated the transfer of personnel within departments, from middle management to the operations level, and across departments, from internally oriented to customer-oriented personnel. In doing so, managers of New City minimized operating costs while maintaining the same level of services. In contrast, IT in Old City did not facilitate such an agenda and managers downsized more superficially across the board, in all departments. Differences in IT consequences in the two cities are explained using the theory of slack resources in organizations.

(*Information Technology*; *Organization Downsizing*; *Middle Management*; *Environmental Context*; *Organizational Slack*; *Change Strategy*; *Strategic Reorientation*; *Convergent Change*; *City Governments*)

In today's highly competitive and turbulent environment, downsizing continues to be used by organizations to reduce operating costs, increase flexibility, and improve responsiveness. During the heyday of downsizing efforts (1987–1991), more than 85% of Fortune 1000 firms downsized their white-collar work forces, effecting more than five million jobs (Cascio 1993). Although middle managers made up only 5 to 8% of the work force, they accounted for 17% of all dismissals from 1989–1991 (Cascio 1993). The persistence of white-collar downsizing in the late 1990s is attributed to high penetration of IT and to the large administrative overhead of American companies in comparison to that of their foreign competitors (Budros 1999).

Speculation that IT would lead to downsizing dates back to Leavitt and Whisler (1958) who argued that IT would take over most routine decision and communications activities of middle managers and massively reduce their number. IT can automate many decisions and make information widely and easily accessible throughout the organization. This allows top managers to bypass middle managers in organizational communications and to centralize decision making above middle managers. Downsizing occurs because many middle managers are no longer needed. While some empirical evidence supports this argument (Brynjolfsson et al. 1994, Budros 1999), other evidence indicates that downsizing can be caused by factors such as adverse environmental conditions (Freeman and Cameron 1993, Tushman and Romanelli 1985). In fact, our knowledge of the causal relationship between IT, environmental conditions, managerial actions, and organizational downsizing is quite limited.

This paper takes the study of organizational downsizing a step further than previous studies by exploring what role IT plays in downsizing and what influence environ-

mental conditions and managerial actions have on the process. The paper is organized as follows. First, the literature on organizational downsizing is quickly reviewed and a general theoretical framework describing the role of IT in organizational downsizing is proposed. Second, the research method is described and third, the findings of the two case studies are presented. Then, the differences in IT consequences in the two cities are explained using theory about slack resources in organizations. The paper concludes by discussing the study's contributions and future research.

Information Technology and Organizational Downsizing

Organizational downsizing—the planned elimination of positions or jobs designed to improve organizational efficiency and/or effectiveness—is characterized by four main attributes. First, it is undertaken purposively or intentionally, usually in response to environmental conditions such as economic slowdowns or hypercompetition (Budros 1999, DeWitt 1993, Freeman and Cameron 1993, Tomasko 1993). Second, it involves reductions in personnel that might occur through direct elimination of jobs, or indirectly, as a result of eliminating functions, hierarchical levels, or entire units. Third, it is aimed at improving the efficiency and/or effectiveness of the organization (Freeman and Cameron 1993). Finally, downsizing changes work processes. For example, when the work force is reduced, fewer employees are left to do the same amount of work and this alters what gets done, how it gets done, and how workers feel about the change in work processes (Freeman and Cameron 1993).

The nature of downsizing is contingent upon the change strategy used by the organization (Freeman and Cameron 1993, Kuwada 1998, Tushman and Romanelli 1985, Pinsonneault and Rivard 1998). *Strategic reorientation* is revolutionary and characterized by short, discontinuous, and radical changes. It is often precipitated by environmental turbulence and adverse conditions, and involves abrupt and simultaneous shifts in strategy, power distribution, structure, and operations systems. Top managers often initiate such change and mediate between internal inertia and environmental turbulence. In contrast, *convergent change* occurs over relatively longer time periods and is characterized by incremental change and adaptation. This type of change is geared toward achieving greater consistency among the organization's internal activities.

Downsizing can result from either kind of change. When convergent change is undertaken, downsizing is expected to be incremental, require less redesign, be char-

acterized by the desire to do the same things better, and reinforce existing structures (Cameron et al. 1987, Freeman 1994, Freeman and Cameron 1993, Levine 1985, Robertson 1987, Tushman and Romanelli 1985). Downsizing associated with strategic reorientation is likely to be more severe and reflect an effort to do different things or to do the same things differently (Bailey and Szerdy 1988, Ferris et al. 1984, Tomasko 1987).

IT and Organizational Downsizing

There are three broad downsizing approaches: (1) changes in work such as eliminating tasks, increasing span of control, or standardizing work, (2) changes in technology such as eliminating jobs by automating work, or (3) changes in structure such as closing plants, eliminating hierarchical levels, and merging, reorganizing, or eliminating organizational units (Freeman and Cameron 1993). These approaches involve progressively more restructuring and integration. Redesigning work can be done locally for a specific task or subtask, but changes in structure necessitate more integrated changes in which resources of different units are reallocated and merged. Freeman and Cameron (1993) argue that managers favor an incremental approach to downsizing aimed at reducing risk. Thus, when managers undertake convergent change, they mostly focus on changes in work, followed by changes in technology, and lastly by changes in structure. In contrast, when reorientation occurs—usually in response to adverse environmental conditions—managers adopt more radical strategies starting with changes in structure, and then technology and work. This usually results in large downsizing of staff, including administrative staff (Cameron 1994, Cameron et al. 1991, Freeman and Cameron 1993).

The information systems (IS) literature indicates that IT might play a different and more central role in organizational downsizing than the one depicted in the downsizing literature. Rather than being one of three relatively independent downsizing approaches, IT is likely to be a key enabler or facilitator of work and structural changes, which lead to organizational downsizing (Budros 1999, Markus and Robey 1988, Orlikowski 1992, Orlikowski and Robey 1991, Pinsonneault and Kraemer 1993, 1997).

Theoretical Model

A preliminary theoretical model describing the role of IT in organizational downsizing has been developed based on the IS and downsizing literature and is used in this study to examine the IT role in organizational downsizing (see Figure 1).[1] The model suggests that IT facilitates work and structural changes that lead to organizational

Figure 1   Organizational Downsizing Theoretical Model
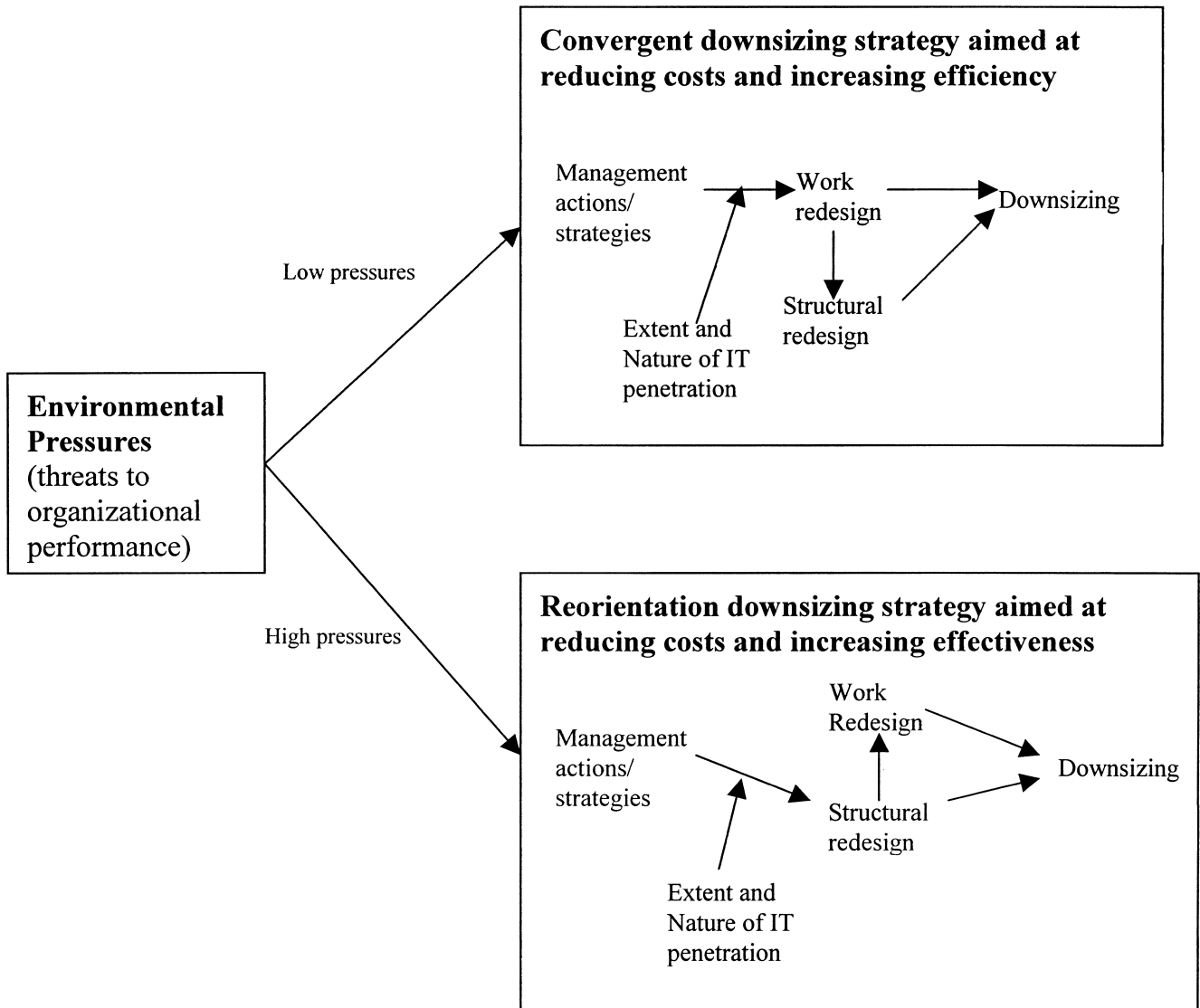
downsizing. The two downsizing approaches (work and structural redesign) are important in all situations, but they enter the scene in a different order depending on environmental pressures and the change strategy favored by managers. Moving from left to right, Figure 1 reads as follows. The downsizing literature suggests that environmental conditions that threaten performance will motivate managers to downsize organizations and will influence the strategy they use to do so.

Managers facing mild environmental threats or pressures (top portion of Figure 1) rely on a convergent change strategy aimed at reducing operating costs and increasing efficiency. In this situation, because the pressure is not strong and because managers minimize risk,

they are likely to use an approach focused on work redesign. Structural changes resulting from this type of downsizing are likely to be minimal (e.g., change in the span of control, responsibilities).

The empirical research in IS indicates that IT can facilitate changes in work by increasing individual efficiency and allowing fewer individuals to perform the same amount of work (Budros 1999, Orlikowski 1996, Davenport and Short 1990, Kimble and McLoughlin 1995). In a six-country Western European study, Dopson and Stewart (1993) found that IT was associated with a smaller number of middle managers having a greater responsibility for a wider range of tasks. Pinsonneault and Rivard (1998) studied IT use by 59 middle managers in

three large firms and found that it was associated with changes in the time managers allocated to different activities. Managers using IT spent more time on information-related activities (e.g., reading reports, gathering information), on disturbance handling activities (e.g., resolving conflicts, managing crises), and on negotiation-related activities (e.g., discussions with colleagues on resource sharing, discussions with subordinates on performance standards). They suggested that this change in time-allocation patterns occurred because managers spent less time on routine tasks rendered more efficient by IT and more time on other tasks judged as critical for the firms. Similarly, Foster and Flynn (1984) found that IT use in one General Motors plant was associated with knowledge workers spending more time communicating task-relevant information (in contrast to socially oriented communications) and concentrating efforts on tasks for which they were uniquely qualified. This increased the overall productivity, freed time for numerous workers across the organization, and led managers to consolidate jobs.

On the other hand, when faced with strong environmental pressures (bottom portion of Figure 1), top managers use a more radical change strategy aimed both at reducing operations costs and increasing effectiveness. In such a situation, managers are likely to rely on drastic downsizing efforts that focus on changing organizational structure and work systems. Such a downsizing strategy will be facilitated by the extent to which IT penetrated the organization across hierarchical and functional divisions and has become embedded (Pinsonneault and Kraemer 1993, 1997). The research indicates that IT can help transforming organizational structures in three main ways, all of which facilitate downsizing. First, IT can be a catalyst in the redesign of business processes (Davenport 1993, Gallier and Baets 1998, Hammer and Champy 1993, Markus and Benjamin 1997, Sethi and King 1998). IT can help in performing major structural changes by automating interfunctional processes (e.g., budgeting, human resource management, planning), eliminating intermediaries, integrating different roles and tasks, automating organizational routines, and routinizing complex decisions (Davenport and Short 1990).

Second, IT can alter the communications across units and hierarchical levels in such a way as to facilitate the coordination and control of diverse activities (Fulk and DeSanctis 1995, Lind and Zmud 1995, Orlikowski et al. 1995, Sarbaugh-Thompson and Feldman 1998, Zack and McKenney 1995). Hinds and Kiesler (1995) studied seven departments of a large telecommunications firm and found that communication technologies facilitated extradepartmental and lateral communications rather than vertical communications. This, they argued, can lead to

horizontally structured technical teams crossing "traditional" organizational boundaries. In a study of geographic information system (GIS) use in two county governments, Robey and Sahay (1996) found that in one site (North County) GIS allowed much faster and superior spatial analyses and transformed the way business was conducted, while eliminating organizational barriers between departments.

Third, IT can modify the decision-making structure of organizations. Prechel (1994) documented how automating the accounting and budgeting systems in a large steel manufacturer centralized decision making and control at the top of the hierarchy, reduced the information processing activities of middle managers, and eliminated many decisions that they formerly made. This eliminated four layers in the managerial hierarchy. In a recent study of 155 city governments, Pinsonneault and Kraemer (1997) found that the effects of IT on organizational structure depended on which dominant coalitions controlled major computing decisions. When computing decision authority was centralized at the top management level, IT was associated with fewer middle managers and, conversely, when it was decentralized at the middle management level, IT was associated with a higher number of middle managers.

Thus, the theoretical model suggests the following five propositions:

PROPOSITION 1. *When environmental pressures are low, managers will use a convergent downsizing strategy.*

PROPOSITION 1A. *In a convergent strategy, IT will be used to facilitate work redesign, leading to small personnel reductions.*

PROPOSITION 2. *When environmental pressures are high, managers will use a reorientation downsizing strategy.*

PROPOSITION 2A. *In a reorientation strategy, IT will be used to facilitate structural and work redesign, leading to large personnel reductions.*

PROPOSITION 3. *The greater the extent of IT penetration and the more integrated its applications, the more it will facilitate downsizing.*

Method
To explore the role that IT plays in organizational downsizing, a 10-year longitudinal study of two American city governments was conducted.

The Sites
The study was conducted in city governments for two main reasons. First, environmental conditions of cities

continually change and, as in industry, the most likely candidates for downsizing are those organizations struggling to get through hard times (Cascio 1993). Since the mid-1980s, city governments in the United States have lost tax base from corporate downsizing, federal and state revenues, and taxing power due to citizen-initiated tax limitations—all in the face of growing demands for service from population growth and growing citizen expectations. Second, when faced with such a situation, managerial strategies are usually oriented toward cutting costs rather than reducing services.[2] In city governments, costs can be reduced through either: (1) a less radical downsizing approach based on work redesign (e.g., consolidation of tasks, hiring freezes, early retirement incentives, personnel reductions) and investment in labor-saving IT or (2) more radical downsizing and redeployment of resources based on investments in labor-saving IT and on structural and work redesign (e.g., eliminating jobs, consolidating departments, moving people from one job or department to another).

In 1985, we started observing two American city governments where downsizing was likely to occur during the next few years. Two medium-sized California cities were chosen (New City, Old City)[3] using data from an earlier survey of American city governments.[4] New City and Old City were relatively fast growing. New City's population grew from 80,234 in 1985 to 124,000 in 1995, while Old City's population grew from 95,000 to 120,186 in the same period. The two cities had a city manager form of government with seven levels of hierarchy: city council, city manager, department heads, division heads, section heads, first-line supervisors, and operations employees. The council of each city was made of five members who decided on overall policy and direction. The city manager was responsible for implementing the policies elaborated by the council and for channeling information from City Hall to the council. In addition, the city managers controlled communications between department heads and the council, hired and fired department heads and other managers, and decided on all budget matters. IT-decision authority was also centralized in both cities, as it rested with the IT managers who reported directly to the city manager.

Concepts, Measures, and Data Collection

The study involves four main concepts: environmental pressure, change strategy, downsizing, and IT penetration. They were measured through three main data sources: in-depth interviews, a questionnaire, and documents. Table 1 presents the methods used to measure the different concepts.

A total of 73 interviews were conducted with different managers in the two sites: 40 in 1985 (21 in New City and 19 in Old City), 13 in 1990 (7 in New City and 6 in Old City), and 20 in 1995 (12 in New City and 8 in Old City). One questionnaire was used in 1985 to provide factual data concerning IT penetration in the two cities. Finally, documents (i.e., annual budgets, *State Controller Annual Report on Financial Transactions for Cities of California*—a standardized audited report—and IT annual plan) were used every year between 1985 and 1995. These documents complemented the data gathered from the other sources and allowed us to unobtrusively observe the evolution of each city.

Environmental pressure is the degree to which environmental conditions threaten the performance of the organization, which for city government is the capacity to deliver the level and quality of services that the population demands. In 1985, environmental pressure was assessed through 20 interviews in New City (1 city manager, 6 department heads, and 13 middle managers) and 18 interviews in Old City (1 city manager, 5 department heads, and 12 middle managers). Managers were asked to describe how the economic environment changed over the recent years and how this effected their ability to meet the population's service expectations. Thirteen additional interviews were conducted in 1990 (seven in New City and six in Old City). These sought to understand how the major environmental change that was occurring in the cities (i.e., recession, and reduction in federal and state revenues) might effect the cities. These interviews also were used to validate the analysis of the 1985–1990 period. In 1995, 18 additional interviews were conducted with the city manager, department heads, and some middle managers (11 in New City and 7 in Old City) to obtain additional data on the environmental pressures and to validate our preliminary analysis of each case study. The budgets of the two cities and the state controller report were analyzed every year to gather a detailed compilation of economic and financial data pertinent to their operations (e.g., population growth, propositions concerning taxing or service level, revenue trends, recessions).

Change strategy reflects a series of actions taken by managers to face environmental pressures. As discussed earlier, the strategies can be categorized into two broad groups: convergent strategy and reorientation strategy. Data on the change strategies used by managers were gathered mainly though the interviews with top and middle managers in each city in 1985, 1990, and 1995. Managers were asked to describe their main initiatives to face increasing demand for services given their budget. In addition, city managers were asked to describe major events

Table 1   Data Collection

	Data Collection Methods		
	1985	1990	1995
New City			
Environmental pressure	Interviews: CM, 6 DH, 13 MM	Interviews: CM, 6 DH	Interviews: CM, 5 DH, 5 MM
	State controller report*	State controller report	State controller report
	Annual budget*	Annual budget	Annual budget
Change strategy	Interviews: CM, 6 DH, 13 MM	Interviews: CM, 6 DH	Interviews: CM, 5 DH, 5 MM
	Annual budget	Annual budget	Annual budget
Downsizing	Interviews: CM, 6 DH, 13 MM	Interviews: CM, 6 DH	Interviews: CM, 5 DH, 5MM
	Annual budget	Annual budget	Annual budget
IT penetration	Questionnaire: ITM	Annual budget	Interview: ITM
	Interview: ITM	IT annual plan	Annual budget
	Annual budget		IT annual plan
	IT annual plan*		
Total	Questionnaire: 1	Interviews: 7	Interviews: 12
	Interviews: 21	Documents: 3	Documents: 3
	Documents: 3		
Old City			
Environmental pressure	Interviews: CM, 5 DH, 12 MM	Interviews: CM, 5 DH	Interviews: CM, SACM, 5 MM
	State controller report*	State controller report	State controller report
	Annual budget*	Annual budget	Annual budget
Change strategy	Interviews: CM, 5 DH, 12 MM	Interviews: CM, 5 DH	Interviews: CM, SACM, 5 MM
	Annual budget	Annual budget	Annual budget
Downsizing	Interviews: CM, 5 DH, 12 MM	Interviews: CM, 5 DH	Interviews: CM, SACM, 5 MM
	Annual budget	Annual budget	Annual budget
IT penetration	Questionnaire: ITM	Annual budget	Interview: ITM
	Interview: ITM	IT annual plan	Annual budget
	Annual budget		IT annual plan
	IT annual plan*		
Total	Questionnaires: 1	Interviews: 6	Interviews: 8
	Interviews: 19	Documents: 3	Documents: 3
	Documents: 3		

CM: City Manager, ITM: IT Manager, DH: Department Heads, SACM: Senior Assistant to the City Manager, MM: Middle Managers
*Every year between 1985 and 1995, the state controller report, annual budget, and IT annual plan were analyzed. This table indicates the number of documents analyzed in any one year. Interviews; however, were conducted only in 1985, 1990, and 1995.

that occurred (related to level of services, revenues, and employment level) since last interviewed. Annual budgets synthesized the strategic orientation the city used in the previous years and the one it would use in the next few years.

Downsizing refers to the planned and deliberate elimination of jobs (often accompanied by a reduction in personnel) in organizations through redesign of work and organization structure. We differentiated middle managers from operations managers because we wanted to analyze where downsizing was taking place, and whether middle managers would be downsized more than other

managers. The concept of middle management is difficult to precisely define because categorization of managers is fluid and changes over time. However, in essence, middle managers operationalize, detail, further define, and disseminate information about objectives, policies, and structural changes formulated at the top of the hierarchy. They mediate between top and operations-level managers by communicating and interpreting policies downward to operations managers and by monitoring and aggregating detailed information from operations upward in a form useful to top managers. The lower boundary of middle management is usually set above first-level supervisors

(who are responsible for executing policies and procedures) and the upper boundary is usually set below department heads (who are responsible for designing policies and procedures) (Pinsonneault and Kraemer 1997). Thus, in the structure of the two cities, middle management comprised the division and section heads and were in two primary locations: (1) the central staff functions of government such as management analysis, budgeting, accounting, purchasing, and personnel and (2) the line management positions within city departments.

To assess the downsizing construct, interviews with the city managers, department heads, and middle managers were conducted in each city in 1985, 1990, and 1995 (see Table 1). Managers were asked to describe the changes that had taken place in employment levels in each department as well as how these changes were achieved (i.e., IT-enabled, straight staff reductions through attrition, changes in work and/or structure, mergers of departments). In addition, objective data on employment in each department and hiring policies and practices were gathered from the annual budget of each city.

Finally, *IT* is conceptualized as the extent and nature of penetration of the technology within the organization, including, for example, the number of computer applications in operation.[5] IT penetration is most directly relevant to this analysis because it measures the degree to which computers have been applied in the organization broadly, across functions horizontally, and across levels of the hierarchy vertically. The more pervasive and integrated the technology's application, the more it can be used to facilitate downsizing (Pinsonneault and Kraemer 1993, 1997). IT penetration was measured initially (in 1985) through a questionnaire[6] that contained an inventory of 187 IT applications and asked the IT managers to indicate which applications were in operation, in development, planned in the next three years, or not planned.[7] In addition, this questionnaire measured the structure of computing authority and the IT infrastructure (e.g., number of personal computers, number of local area networks, number of mainframe computers). Each year, the annual IT plan (which described the major IT applications recently implemented and those under development) and the city budget (which described in what departments the IT applications were implemented and what impacts they had on personnel) were used to update the inventory of IT applications. Interviews with the IT manager were conducted in 1985 and 1995 to complete our assessment and validate our data.

Findings: A Tale of Two Cities

The environmental conditions, common to both cities, are presented first. The results are then organized as follows.

For each city, the IT penetration is presented, followed by a description of the change strategies, and by a discussion of IT impacts on organizational downsizing. The analysis ends with a cross-case discussion of the findings based on slack resources theory.

Environmental Pressures
Figure 2 presents the revenues per capita and population growth for New City and Old City between 1985 and 1995. It indicates that New City and Old City faced two distinct periods: 1985–1990 when overall revenues increased rapidly in both cities, and 1990–1995 when they substantially declined. Between 1985 and 1990, the environmental pressures to rationalize were relatively mild. Both cities had healthy and growing local economies. Overall revenues grew by more than 50% in New City and 70% in Old City. However, as in most American cities, federal and state revenues substantially decreased. In addition, as did cities in Michigan, Massachusetts, and in other states as well, California cities experienced reductions in local property taxes as a result of California's Proposition 13 tax limitation. This led top managers to control operating costs. In 1990–1995, environmental pressures for rationalization were much stronger. On top of diminishing state and federal revenues, a major economic downturn reduced annual sales tax revenues (the single largest revenue source of cities) by about 20% (or $5 million) in New City and 35% (or $9 million) in Old City.[8] Further, both cities suffered revenue losses of an additional $5 million per year due to "state take-away programs."[9] As a result, the overall revenue per capita decreased by more than 30% in New City and 70% in Old City over that period.

While revenues declined, demand for services (population growth) increased. Figure 2 indicates that between 1985 and 1995, the population of New City grew by 55% (80,234 to 124,000) and that Old City grew by almost

Figure 2   Revenue and Population Growth in New City and Old City (1985–1995)
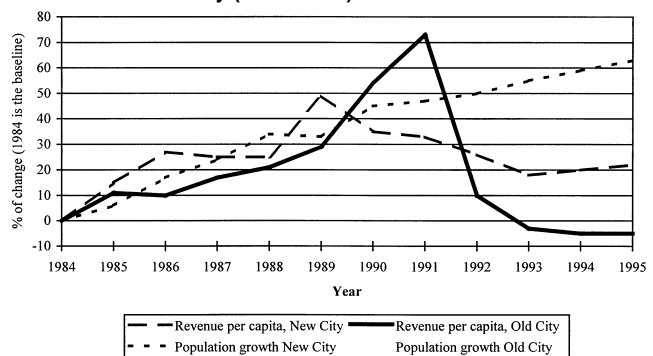
30% (95,000 to 120,186). In addition, both cities had to maintain their historical funding commitment to street maintenance and improvement programs because of the 1990 voter-mandated Proposition 111 and Measure M.

New City

The Extent of IT Penetration. Top management in New City heavily invested in IT as a matter of policy throughout 1985–1995. IT was seen as a key factor in delivering efficient and high-quality service to the population. Between 1985 and 1990, IT budgets increased from $610,000 to $2.520 million and stabilized until 1995. In 1985, it had 105 running applications, 128 in 1990, and 138 by 1995. Between 1985 and 1990, most investments were made to automate the public safety, public works, public services, administrative services, and the community development departments. New City automated the basic operational information systems (i.e., purchasing, accounts receivable and payable, payroll and inventory systems) in the early 1980s.

Between 1985–1990, development efforts were refocused toward managerial applications (i.e., budgeting, personnel simulation, geoprocessing (GIS), vehicle dispatching, manpower allocation systems). In a conscious effort to pursue its investment in managerial applications, top managers of New City outsourced all maintenance, support, and cabling to a local vendor in 1990, which reduced the operations cost of the IT department. In 1990–1995, four new applications were implemented in the community services department and five in the administrative services department. In addition, all applications were highly accessible to employees as New City had a ratio of one personal computer for every employee in 1995.

New City favored a database approach and network infrastructure in which the different applications were integrated. Originally, the Pick programming language was used, which made database applications available online, and gave the city a boost on its computing in two regards: new applications could be brought up faster and managerial applications could be developed more easily because of the database features.

Managerial Change Strategy. Two different strategies were used in New City during 1985–1990 and 1990–1995. Top managers used a convergent change strategy in 1985–1990. The city manager of New City indicated in the interviews that their main strategy then was to maintain the level of existing services offered to the population without profoundly changing the structure or the operations of the city. As he stressed, "Why make major changes when you can achieve the desired results by

changing a few things here and there." However, he also felt that the city had to offset reductions in state and federal revenues, which he achieved by increasing license and permit fees, charging new fees for services, using bond financing for capital projects, and increasing long-term debt. In addition, New City also relied on personnel reduction measures, such as reducing new hires and using more part-time workers. Top managers successfully mitigated revenue reductions such that by 1989 New City experienced increasing overall revenues while maintaining service levels.

Because of the 1990–1995 recession, New City was faced with important revenue reductions (as illustrated in Figure 2). The city council strongly reacted to decreasing revenues and substantially reduced expenditures that lowered the level of services. In turn, citizens became dissatisfied and exerted pressure on top managers to improve the level of services (Proposition 111 and Measure M earlier discussed are clear manifestations of this). However, even under normal circumstances, the task of increasing service levels to match rapid population growth is exceedingly difficult because revenues follow growth rather than precede it. This difficulty is exacerbated in periods of fiscal stress. As indicated by the city manager, "This situation offered us no alternative but to rationalize and reorganize operations in such a way as to dramatically decrease costs while trying to maintain the service level." Major structural changes took place in 1991 as the public services department was merged with public works and community development (a reorientation change strategy based on structural redesign).

Impacts of IT in New City. Table 2 presents the changes in the number of operations employees and middle managers, and the IT-penetration levels for every department of New City for 1985–1990 and 1990–1995.

Recall that, in 1985–1990, top managers of New City relied on limited downsizing and rationalization of operations to mitigate lower revenue. Rather than decreasing employment, they controlled growth, modified work of some employees, and reallocated personnel. Table 2 indicates that, overall, the number of operations employees and middle managers increased by 33% and 28%, respectively (bottom row of Table 2). In all internally oriented departments (i.e., departments servicing other departments and not directly serving the population), the number of middle managers and operations employees increased substantially. However, a closer analysis reveals that although there was no major reorganization, IT was associated with some downsizing of middle management in the highly automated customer-oriented departments (public safety and public services). The number of

Table 2   Evolution of the Number of Employees by Department and IT Penetration: New City

Departments		1985 Number of Employees	1990 Number of Employees	(% change 1985–1990)	Level of IT Penetration	1995 Number of Employees	(% change 1990–1995)	Level of IT Penetration
Customer Oriented								
Community services	Operations employees	34	48	(+41%)	30% (6/20)*	61	(+27%)	50% (10/20)
	middle managers	16	19	(+19%)		14	(−26%)	
Public safety	Operations employees	154	174	(+13%)	67% (28/42)	170	(−2%)	69% (29/42)
	middle managers	14	12	(−14%)		10	(−17%)	
Public works	Operations employees	89	162	(+82%)**	68% (26/38)	150	(−7%)**	69% (41/59)**
	middle managers	12	19	(+58%)**		15	(−21%)**	
Public services	Operations employees	99	108	(+9%)	71% (15/21)	Included in public works and commu-		
	middle managers	14	12	(−14%)		nity development departments		
Total customer oriented	Operations employees	376	492	(+31%)	62% (75/121)	381	(−23%)**	66% (80/121)
	middle managers	56	62	(+11%)		39	(−37%)**	
Internally Oriented								
Administrative services	Operations employees	63	71	(+13%)	82% (42/51)	48	(−32%)	92% (47/51)
	middle managers	18	24	(+33%)		14	(−42%)	
Community development	Operations employees	67	105	(+36%)**	73% (11/15)	61	(−42%)**	73% (11/15)
	middle managers	14	27	(+93%)**		16	(−41%)**	
Total internally oriented	Operations employees	130	182	(+40%)	80% (53/66)	109	(−40%)	88% (58/66)
	middle managers	32	51	(+59%)		30	(−41%)	
Overall Total	Operations employees	506	674	(+33%)	68% (128/187)	490	(−27%)	74% (138/187)
	middle managers	88	113	(+28%)		69	(−39%)	

*The numerators indicate the number of IT applications in operation and the denominators indicate the number of potential managerial applications in a particular department.

**At the beginning of 1990, the public services department was merged into the public works and community development departments. Following that merger at the beginning of 1990, public works had 162 operations employees and 19 middle managers, and the community development department had 105 operations employees and 27 middle managers. The managerial applications were transferred from the public services department to public works.

middle managers deceased by 14% in each department while the number of operations employees increased by 13 and 9% in public safety and public services, respectively. The public safety department offers a good example of how IT was used to downsize middle management and reallocate excess personnel to operations, where they served the population directly. The staff services section is responsible for managing police records, the front desk (which is the first contact for citizens needing police services), and communications. In 1988, a Computer-Aided Dispatch/Records Management System (CADRM) was added with the objective of assisting in working smarter and more efficiently. The department head reported that:

> . . . this system [CADRM] facilitated the dispatching so much that we were able to transfer two senior public safety assistants (middle managers) from police records to the front desk. We hoped that increase in staffing and service level at this point in

the organization would have a positive impact on the effectiveness and efficiency of all sections of the police department.

IT was not associated with any downsizing of middle management in the internally oriented departments. Thus, in 1985–1990, New City management relied on a convergent change strategy that focused on doing the same things as before, but at a lower cost. This was mainly achieved by using some IT applications like the CADRM system to increase individual efficiency and enable work redesign.

Downsizing was much more pronounced in 1990–1995. Overall, operations employees decreased by 27% and middle management decreased by 39% (bottom row of Table 2). Table 2 indicates that although all departments of New City reached a high level of IT penetration in 1990–1995, downsizing was more pronounced in internally oriented departments than in customer-oriented

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departments (reduction in middle management and operations employees averaged 40 and 30%, respectively). Top managers indicated that this selective downsizing, as opposed to an across-the-board approach, was done in an effort to minimize the impact of the rationalization process on service levels. In addition, middle managers in customer-oriented departments were reduced (-37%) more than operations employees (-23%), who were critical to maintain service levels. In this period, downsizing was more important than in 1985–1990 and was achieved through both work and structural changes. The administrative services department illustrates well how IT was used to facilitate work redesign leading to organizational downsizing in internally oriented departments. In 1990, a new integrated budgeting system was implemented, which allowed department heads to directly access and control data on their respective budgets, and the city manager to directly and continuously monitor the spending of the different departments. In addition, new budgets were prepared and submitted online following the constraints and guidelines established by the city manager. The city manager then consolidated the different budgets and started a negotiating round. Prior to the implementation of the budget system, the middle managers and employees of the administrative services department manually performed this work. As stressed by the city manager,

> The budgetary system is a tool that helped me to downsize and negotiate budgets. It is a key to my downsizing strategy, which is a basic realization of a no-win situation. I used downsizing because I had no other option anymore. During the 1980s, we were able to take the revenue hits and absorb them. By the early 1990s, this was no longer possible and I had to come up with something. The council wanted an action that would send a message to both the public and to the employees. For the public, it was, "We're taking care of business." For the employees, it was, "You could be next." My hope was first, to take the pressure off the council and me; second, to forestall further cuts; and third, to motivate the staff to work harder so my first and second hopes would be realized. The computerized budget system was a key tool that helped me do this in that it allowed me to eliminate two positions. Also, it gave me numbers that helped me to calculate the effects of decisions I had to make.

In that period, IT was also used to facilitate more important downsizing based on structural redesign. The case of public services, public works, and community development illustrates well how IT was used in New City to downsize middle management in the customer-oriented departments through major structural changes. At the end of 1990, a new GIS was fully operational in the public works department. The GIS was used to facilitate the coordination and control of activities between public services, public works, and community development. For example, the GIS automatically scheduled street maintenance work in a proper sequence and dispatched work orders (e.g., sewer line repairs, tree trimming, pavement repair and maintenance) to the responsible departments. Prior to implementing the GIS, the coordination of activities was performed manually by middle managers of the three departments. The GIS, thus, provided the technological infrastructure needed by top managers of New City to merge these departments and downsize personnel. The number of employees was reduced from 375 operations employees and 58 middle managers in 1990 to about half that work force in 1995 (201 operations employees and 31 middle managers). Public safety and the community services (two relatively highly automated departments) also experienced a stronger downsizing of middle managers than of operations employees. The reduction in middle managers was eight times that of operations employees (-17 v. -2%, respectively) in public safety. In community services, middle management was reduced by 26%, while operations employees increased by 27%.

By 1995, New City maintained its service level (as constrained by Proposition 111 and Measure M) and significantly increased its operational efficiency. New City had 559 employees and a 4.6 employee per 1,000 population ratio (a ratio often used to measure and compare the efficiency of city governments), which was one of the lowest in California and in the United States.

Old City

The Extent and Nature of IT Penetration. In contrast to New City, which invested heavily in IT even in periods of fiscal strain, Old City's IT budget was smaller. Old City increased from $748,000 to $1,695,000 between 1985 and 1990, but decreased to $869,000 in 1995 (less than half of New City's budget). IT was not seen as key to efficient operations. IT operations were outsourced in 1984 and a minimal team of six programmers and analysts were retained under a senior assistant to the city manager. The decision to outsource IT was essentially a cost reduction effort. And, in contrast to New City top management, which reinvested outsource-related savings into IT applications, Old City top management used the savings outside of IT.

Old City's level of IT penetration was lower than that of New City. Old City had 91 major managerial IT applications in operation in 1985 and 96 in 1990 (25% less than New City). Most investments were made in the operational systems of the internally oriented departments (administrative services, community development). The customer-oriented departments had a relatively low automation level (42% of all potential applications were automated, see Table 3). Old City relied on stand-alone applications (that ran on a Prime computer installed in 1986)

and this lack of integration made it difficult to successfully develop, implement, and use managerial applications. As a result, managers had limited IT support. For example, expenses were entered on several different applications that did not update the central budget monitoring system on a real-time basis. Managers waited up to 15 days after the closing of a given budgetary period to get information on their respective budgets and even then, the information was 30 days old.

Most IT investments in the 1990–1995 period were made to revamp the IT infrastructure. A new Hewlett Packard (HP) 9000 computer and desktop computers were bought, networks were installed, and some operational applications were upgraded (e.g., building permits, business license, utility billing systems). Six new IT applications were developed (two in public safety, one in public works, and three in administrative services). The senior assistant to the city manager indicated,

> . . . This investment was done because we realized that the existing technological infrastructure limited our ability to bring new applications in the city.

In 1995, Old City's IT penetration reached 102 managerial applications in operation, which was 26% less than that of New City. In addition, access to Old City's applications was relatively low (one PC for every three employees).

Managerial Change Strategy. Between 1985 and 1990, top managers of Old City used a convergent change strategy focusing on maintaining the level and quality of existing services offered to the population. As the city manager indicated, "We did not want to change anything internally because we were sure that we would be able to offset the reduction in federal and state funding by revitalizing the local economy." Top managers tried to revitalize the local economic base by providing incentives to attract new firms, retain existing ones, and encourage business expansion. The head of community development indicated that this strategy

> . . . gave particular importance to the community development department, especially to operating employees who went in the field to implement the strategy. It conferred a special role to this department, which became increasingly public oriented.

Growth in operations employees and middle managers followed the increased workload of that department with the implementation of the city's strategy. In addition, Old City issued bonds to pay for infrastructure improvements needed to support retention and expansion of businesses. It also increased collection of receivables, accelerated collection of revenues, increased license and permit fees, and established new fees for selected services. Finally,

top management in Old City restrained increases in employees' salaries and fringe benefits rather than reduce the number of new hires. Top managers were successful in mitigating state and federal revenue reductions such that by 1989, Old City was increasing overall revenues and maintaining the level of services.

As illustrated in Figure 2, Old City faced important revenue reductions in 1990–1995. Given the poor state of the local economy, and limited success in revitalizing it, top managers decided to abandon their previous revitalizing strategy in 1990. The strategy of subsidizing local business seemed to have had no lasting effects as revenues started to decrease rapidly. As a response, the city council of Old City adopted a series of seven deficit and expenditure reduction resolutions in seven consecutive months during 1990–1991. This led to lower service levels and, as in New City, citizen dissatisfaction and increased pressure on top managers to improve the level of services. This situation offered no alternative to top managers but to rationalize and reorganize operations (a reorientation change strategy) to decrease costs while maintaining the service levels. The orientation of the community development department was modified. Rather than trying to revitalize the local economy by proactively implementing programs to attract new business and facilitate the expansion of existing ones, the community development department was limited to planning the development of the city's infrastructure (e.g., roads, parks, recreation centers, housing units).

In 1993–1994, 90 jobs were eliminated across departments, including the IT department that lost two analysts. This flattening was made possible by contracting numerous services such as vehicle maintenance, building maintenance, and printing.

Impact of IT in Old City. Table 3 presents the evolution of the number of operations employees and middle managers and IT penetration level of Old City between 1985 and 1990.

Recall that in 1985–1990, top managers of Old City relied on revitalizing the local economy. However, because this strategy became insufficient to offset decreasing revenues in 1990, they downsized and rationalized the government. Table 3 indicates that while the number of operations employees and middle managers increased by 19 and 7%, respectively, in 1985–1990, their number was reduced by 10 and 24%, respectively, in 1990–1995 (bottom row of Table 3). As can be seen in Table 3, there does not seem to be any pattern associated with IT-penetration levels in the different departments. In 1985–1990, employees grew in all departments, notwithstanding the level of IT penetration. For instance, in public safety (moderate level of IT penetration), the number of

Table 3   Evolution of the Number of Employees by Department and IT Penetration: Old City

Departments		1985 Number of Employees	1990 Number of Employees	(% change 1985–1990)	Level of IT Penetration	1995 Number of Employees	(% change 1990–1995)	Level of IT Penetration
Customer Oriented								
Community services	Operations employees	57	61	(+7%)	15% (3/20)	41	(−33%)	15% (3/20)
	middle managers	5	6	(+20%)		5	(−17%)	
Public safety	Operations employees	267	313	(+17%)	55% (23/42)	333	(+6%)	60% (25/42)
	middle managers	42	45	(+7%)		42	(−7%)	
Public works	Operations employees	106	126	(+19%)	42% (25/59)	153	(+21%)	44% (26/59)
	middle managers	13	13	(0%)		3	(−77%)	
Public services	Operations employees				Included in public works and community development			
	middle managers							
Total customer oriented	Operations employees	430	500	(+16%)	42% (51/121)	527	(+5%)	45% (54/121)
	middle managers	60	64	(+7%)		50	(−22%)	
Internally Oriented								
Administrative services	Operations employees	137	161	(+18%)	71% (36/51)	97	(−40%)	76% (39/51)
	middle managers	19	20	(+5%)		13	(−35%)	
Community development	Operations employees	26	42	(+62%)	60% (9/15)	12	(−71%)	60% (9/15)
	middle managers	9	10	(+11%)		8	(−20%)	
Total internally oriented	Operations employees	163	203	(+25%)	68% (45/66)	109	(−46%)	73% (48/66)
	middle managers	28	30	(+7%)		21	(−30%)	
Overall Total	Operations employees	593	703	(+19%)	51% (96/187)	636	(−10%)	55% (102/187)
	middle managers	88	94	(+7%)		71	(−24%)	

*The numerators indicate the number of IT applications in operation and the denominators indicate the number of potential managerial applications in a particular department.

middle managers and operations employees increased (7 and 17%, respectively). Similarly, in community services (low level of IT penetration), the number of middle managers and operational employees grew by 20 and 7%, respectively. Employment increases were observed in all internally oriented departments, notwithstanding the level of IT penetration.

In 1990–1995, the pattern of employment was relatively simple. Downsizing occurred at both middle manager and operations-employee levels in all internally oriented departments (average of −30 and −46%, respectively). In customer-oriented departments, middle managers were downsized more heavily than operations employees (−22 and +5%, respectively). There is no clear pattern associated with the level of IT penetration. For instance, the number of middle managers decreased more in the two customer-oriented departments with low automation (public works and community services) than in the highly automated one (public safety). Similarly, the downsizing was more pronounced in the low-IT penetration community development department (−71 and −20% for operations employees and middle managers,

respectively) than in administrative services, which had a higher IT-penetration level (76%).

An interview with the senior assistant to the city manager of Old City captured what was happening:

> IT had nothing to do with the city's downsizing. IT did not help us to downsize. For example, in 1992, hand-held computers were installed to read water meters. They certainly decreased errors and reduced data entry. But, there were four meter readers before, and there are still four meter readers now. In fact, computers probably limited our efforts to downsize. When we outsourced our IT department, we were able to reduce the IS staff. But, as we implement new more complex systems, we need to hire more specialists. For example, when we implemented our network, we had lots of problems sharing files and sending e-mail, so we had to hire a network specialist. Also, we needed people to train our employees with the new systems.

By 1995, Old City maintained its service level (as constrained by Proposition 111 and Measure M), but its operational efficiency was relatively low. Old City's ratio of personnel per 1,000 population was 5.88 (707 employees for a population of 120,186).

Discussion

Fundamentally, this study indicates that assumptions about a straightforward causal relationship between IT and organizational downsizing are oversimplified. It brings three refinements. *First, technology per se does not seem to be a determinant of organizational downsizing. Rather, IT is an enabler and its effects depend on the context in which technology is used and on how it is used.* IT facilitated organizational downsizing in New City, but not in Old City (Propositions 2A and 3 supported). Although the change achieved in both cities was in the same direction in 1990–1995; i.e., downsizing, the nature of change substantially differed. Because of its wide penetration, more integrated databases, and greater proportion of managerial applications, IT was well suited to facilitate downsizing in New City. Top management was able to use IT to perform rationalization with surgical precision. In contrast, Old City's low IT penetration, lack of integration, and outsourcing limited such an agenda. Old City managers rationalized across the board, but their downsizing efforts were less successful.

Second, the interplay between IT and downsizing is more complex than originally thought. Downsizing can be an IT-enabled, multilevel, and multistage process. In New City, there was a shift within departments from middle management to operations, and across departments from internally oriented units to customer-oriented units. IT facilitated this downsizing through both work and structural redesign (e.g., changes in work in public safety and the merger of public services, public works, and community development). This finding is consistent with some literature, which indicates that where downsizing occurred in corporations, middle managers in administrative jobs and headquarters jobs were usually given the option of going back into sales and service jobs aimed at increasing revenues, or terminating their employment. Tomasko (1990, p. 31) cites IBM and other companies as engaging in this tactic: "It is no secret that even in companies with strong commitments to no-layoff policies, attrition results from involuntary or semivoluntary job shifts. At IBM, an observer estimated that as many as 20% of those who will be requested to move to field sales and marketing jobs may decide to leave the company instead." Several tactics used by corporations are similar to those used by New City. These include: pay reductions, job sharing, moving of employees to lower paying jobs, selected terminations, retraining and redeploying, and converting headquarters staff to external consultants (Tomasko 1990). This study shows that IT can be used to facilitate these tactics.

Third, more than technology, adverse environmental conditions seem to be the fundamental cause of downsizing. The cities' environmental conditions triggered organizational downsizing, which was mainly realized by IT-enabled work redesign when convergent change was used and by IT-enabled structural and work redesign when reorientation change was used. Although different in focus, top managers of both cities used convergent strategies in the 1985–1990 period (Proposition 1 supported). New City favored internal options and reduced the number of new hires, cut costs, eliminated vacant positions, and reallocated personnel. IT (e.g., the computer-aided dispatching system) facilitated work redesign and increased efficiency (Proposition 1A supported). This helped to reallocate personnel within two departments (public services and public safety) from middle management to operations, perceived as more critical for the organization. Old City top managers favored externally oriented fiscal options such as bond financing and stimulating the local economy. Both cities tried to improve service level while maintaining costs and existing organization structures. However, in 1990–1995, top managers of the two cities used strong, more risky and radical reorientation strategies based on organizational downsizing, structural and work changes, and human resources redeployment (Proposition 2 supported). This finding is consistent with organizational research, which indicates that top managers are more responsive to changes in their external environment and are more inclined to redirect their organizations in periods of disequilibrium (poor performance, weak or declining revenues) (Cameron et al. 1991, Freeman and Cameron 1993, Romanelli and Tushman 1988). It also supports the argument that organization downsizing during convergent change is expected to be less radical and require less redesign than downsizing during reorientation (Cameron et al. 1987, Freeman 1994, Freeman and Cameron 1993, Tushman and Romanelli 1985). Cascio (1993) argued that this is so because when firms struggle to get through hard times, executives estimate that future costs are more predictable than future revenues, and that cutting cost by reducing people is a safe bet (Cascio 1993).

An Organizational Slack Approach to Explaining the Differences

An explanation of why New City successfully adapted to the 1990–1995 sudden and abrupt environmental changes can be found in the organizational-slack literature. It suggests that an organization's capacity to adapt to its environment basically depends on the amount of slack resources (financial, human, or technological resources exceeding what is needed for efficient operations) available in the organization (Bourgeois 1981, Bromiley 1991,

Cyert and March 1963, Miller et al. 1996, Miller and Leiblein 1996, Riahi-Belkaoui 1998, Sharfman et al. 1988). Slack resources constitute a buffer that allows the organization to experiment with new strategies, innovate, and interact more boldly with its environment (Bourgeois 1981, Hambrick and Snow 1977, Meyer 1982, Singh 1986). Organizational slack is not necessarily used when it is created. Rather, it is often absorbed in the organization in the form of excess human resources or technological capabilities and remains as potential that can be used when needed (Riahi-Belkaoui 1998). Organizations create and absorb surpluses in tranquil periods and extract and consume them during crises (Meyer 1982). The relationship between the introduction of IT and the generation of excess resources is well documented in the literature (Baily and Chakrabarti 1988; Budros 1999; Pinsonneault and Kraemer 1993, 1997; Prechel 1994).

Although the case studies do not provide direct empirical evidence, the slack resources argument fits this study's findings well. New City's ability to face the 1990–1995 economic downturn might be due to the fact that it amassed some organizational slack in the form of IT and human resources over the years. Table 2 clearly indicates that New City heavily invested in state-of-the-art IT in 1985–1990, but did not fully extract IT's downsizing potential until 1990–1995. Rather, the 1985–1990 downsizing was intentionally kept minimal and used symbolically to convince elected officials and citizens that top management was proactive.

> Minor personnel changes can have huge perceived effects. Council is vitally concerned that we portray an image of being in control. Moving a few people around has an effect on service levels, but the political effect is far greater. It enables us to say that we are successfully adapting to the fiscal strain and growth pressures. It keeps the media and the public at bay and lets us do our job. By eliminating managerial staff positions and redirecting those resources to operations, we were responding to community values and priorities even in a time of fiscal strain. City Manager of New City

In a sense, by using IT to eliminate a few middle managers' jobs and reallocate those resources to operations, top managers transferred external pressures (dissatisfaction from the citizens regarding the level of services) into the organization where they better controlled matters. By using IT to surgically eliminate some administrative positions and reallocate staff in lower-level positions where they served customers directly, top management increased services without increasing operating costs, which reduced citizen dissatisfaction and the pressure exerted on the city manager by elected officials.

> In cities, top managers are evaluated and rewarded by elected officials more on the basis of the quantity and quality of services provided to the public, than on the basis of efficiency or any other measure of the internal functioning of the organization. Therefore, a key goal of top managers in cities is to at least maintain service levels. City Manager of New City

In 1990, having accumulated some slack in the form of state-of-the-art IT and excess human resources, New City was able to face a turbulent environment through a more risky and bold strategy than used in 1985–1990.

The intensive use of IT seems to allow for more rational, less bounded downsizing decisions, leading to a more efficient and effective extraction and consumption of slack resources when hard times arrive. But, how and why? Bounded rationality refers to human behavior that is "intendedly rational, but only limitedly so" (Simon 1961, p. xxiv). Three main bounds of rationality are relevant to organizational downsizing: language limits, knowledge of a limited set of alternative paths, difficulty in estimating the consequences of alternative paths (Williamson 1975).

Language limits refer to the inability of managers to articulate and communicate their knowledge and reasoning so that their positions are understood and accepted by others. IT can reduce language limits by standardizing language across the organization. For example, in New City, part of the budget was allocated to departments based on the size of their work force, which was calculated in "full-time equivalent" personnel (FTE). By forcing managers to provide detailed calculations of FTE, the integrated budgetary system surfaced differences in methods for calculating FTEs across departments[10] and led the city manager to standardize this calculation for the city as a whole. In addition, the integrated budgetary system replaced four independent systems that had created data discrepancies and often generated disagreement about simple facts. IT-intensive users can also better negotiate and convince others of their views because IT can be used as a tool to communicate and promote a strategy. The integrated budgetary system was key symbolically in communicating the city manager's downsizing strategy. As indicated earlier, the implementation of that system sent a message to the public that the city was taking care of business and to the employees that anyone could be next. The city manager used the budgetary system, ". . . First, to take the pressure off the council and me; second, to forestall further cuts; and third, to motivate the staff to work harder so my first and second hopes would be realized."

Knowledge of alternative paths is limited because, in complex problems, the entire set potential solutions cannot be generated and analyzed. Successful and widespread implementation of IT can make managers aware

of more alternative paths to grow and shrink because it provides information on how technology relates to organizational goals, and it helps managers to learn about work and structure, and how they can be improved with IT. Thus, when circumstances necessitate downsizing, managers in an IT-intensive environment might be able to more efficiently downsize their organizations. For example, the New City budgetary system helped to create slack resources in the administrative services department by eliminating two positions. The city manager also better understood the functioning of other departments, and how the system could replace much of their data entry and budgetary analysis tasks. In a less IT-intensive organization such as Old City, knowledge about IT, work, and structure, and how they fit together might be limited. IT was never seen as a strategic tool to achieve organizational goals. IT knowledge and its potential was limited, and the outsourcing of most IT functions reduced it even more. When downsizing was required, managers were unable to efficiently use IT to do so, and they had to make cuts across the board.

Finally, managers can have *difficulties in assessing the consequences of alternative solutions* because of the complexity of the problem, its nondeterministic nature, and the fact that downsizing decisions are interdependent and often nested together. IT intensiveness can help to alleviate this limit in two main ways. First, it helps in better assessing the consequences of different alternatives. For example, before merging the public services, public works, and community development departments in New City, top managers simulated how a merged department would effect the level and quality of services and the operating costs of the city. Similarly, as the city manager of New City indicated, the budgetary system ". . . gave me numbers, which helped me to calculate the effects of decisions I had to make." Second, IT can provide a broader and more integrated picture of how work and processes of different departments are related to each other. This can facilitate a better alignment of local rationalities into an organization-wide rationality.

Thus, managers in an IT-intensive organization might face a "less bounded" downsizing decision-making process. As a result, they might more efficiently extract and use slack resources, leading to more rational and successful downsizing. Using IT intensively to build organizational slack might provide more information about avenues for "growing smarter," whether growing larger or smaller.[11]

Contributions and Future Research

There are three main contributions of this research. First, most past studies looked at organizational downsizing at an aggregated level of analysis using a cross-sectional approach. This study takes a detailed look at two highly comparable organizations over a long time period and examines the causal structure between IT, environmental conditions, managerial actions, and downsizing. It shows that downsizing can be an IT-enabled, multilevel and multistage, process that occurs across hierarchical levels and functions.

Second, it suggests that slack resources theory provides new insights into the relationship between IT and *how* downsizing occurs in organizations. The study indicates that IT might facilitate organizational downsizing through the creation of slack resources of various kinds. Personnel, money, and time are freed from IT-enabled staff downsizing and business process streamlining. These slack resources are latent and not always known or taken advantage of by managers when created. Rather, they seem to be absorbed in the organization during tranquil and prosperous periods and captured and extracted by managers during periods of organizational reorientation.

Third, the study raises an important issue about the conceptualization of IT intensity or penetration. IT intensiveness seems to be broader than technology per se. It seems to be a proxy for a more powerful and subtle concept: the capacity to understand details of task, structural, and technological domains as they relate to organizational goals. Rather than being opaque and monolithic, IT intensiveness seems to be a constellation of technology; knowledge about task, structure, and technology; and action. Thus, IT intensiveness really means that managers know about technology and how it relates to tasks and structures and that they make intensive *use* of IT to achieve organizational goals.

Finally, the study suggests that an important new avenue for research would be to isolate the effects of initial change strategies and IT on eventual downsizing levels. We observed an interaction of initial change strategies and level of IT penetration. That is, although both cities used convergent change strategies in 1985–1990, they were not identical: New City began early to limit labor costs, whereas Old City focused on revitalizing its local economy. So, it is possible that in addition to different IT-penetration levels, the initial change strategy might have played an indirect role in later downsizing. Using the slack resources theory, it could be argued that New City's initial downsizing (even if it were mostly symbolic in nature) created new slack resources that were used to foster more significant redesign in 1990–1995. Thus, it is possible that Old City's effort to minimize downsizing in 1985–1990 might have actually limited the extent to which change could be later implemented. Because of the nature of our study (i.e., observing two cities in a natural

setting over time), we cannot separate the effects of the two potential sources of the differences in observed downsizing. To achieve this, a study would have to show that there is a significantly greater proportionate downsizing related to environmental pressures, controlling for initial change strategy as moderated by IT penetration.

Acknowledgments

Endnotes

[1]Figure 1 presents two causal sequences of downsizing, but others exist. For instance, Business Process Reengineering specifies a causal sequence starting with process redesign (part of structure and work practice in our framework), followed by changes in IT systems, job roles, and organization structure.

[2]Revenue enhancement and cutbacks in services are alternative strategies that can be used to face decreasing revenues. Revenue enhancement can be achieved through means such as immediate levy of new fees for services or longer-term economic development efforts to enhance the city's tax base. However, such a strategy has limited potential in a period of fiscal strain and economic downturn. In addition, in city governments, personnel costs comprise roughly 80% of the annual operating budget, and middle managers comprised a growing proportion of those costs prior to the 1990s. When faced with trade-offs between cutting service costs and increasing revenues, top management might well conclude that service costs are more predictable than future revenues and thus cut costs by cutting people. Cutback in services is an alternative strategy with short-term effects; however, it is politically risky. In addition, some city governments are constrained by measures forcing them to offer a minimum constant level of services to the population.

[3]These names are used to preserve anonymity. Three main factors motivated the choice of these two cities. First, in 1985, both cities started to experience environmental conditions that were conducive to downsizing. Revenues from federal and state governments started to decrease and there were strong population pressures to increase services. Second, the economy of both cities was mixed, which was representative of medium-sized American cities in general. Third, the extent of IT penetration and the nature of IT applications differed across the two cities (see the subsequent description of their respective IT). Also, departments of the two cities had varying degrees of IT penetration that allowed for a rich analysis of IT consequences.

[4]Details of that study can be found in Danziger and Kraemer (1991).

[5]IT could have been conceptualized in terms of the technology itself, including considerations such as power, capacity, and sophistication, or the actual use of the technology by individuals in the organization, but the measure chosen was more appropriate.

[6] For details on the instrument validation and tests, see Danziger and Kraemer (1991) and Pinsonneault and Kraemer 1997.

[7] In an effort to keep the focus of the present study on organizational downsizing, only the IT applications that had potential effects on downsizing were included in the analysis presented in Tables 1 and 2. To choose the relevant applications, the two researchers and another researcher expert in city governments computing (but not involved in this study) independently determined whether or not an IT application (a) crossed hierarchical levels and allowed higher level managers to monitor lower level activities, and to disseminate information directly without middle management intervention (e.g., EIS, budget control, scheduling, inventory management, dispatching systems), (b) supported interunit communication and coordination across units or departments (e.g., geographical information systems, financial systems, electronic mail), and/or (c) increased middle managers' personal efficiency and productivity (e.g., word processing, spreadsheets). Applications that did not perform at least one of these three functions were excluded. The three researchers then shared and compared their respective assessments and a consensus on what applications to retain was reached through a group discussion. A total of 187 applications were included in this study. Examples of applications that were excluded are: severe weather monitoring, in-house printing and publishing, telephone line switching, program debugging routines, IT capacity analysis, public buildings energy use monitoring and control system, rainfall analysis, and library periodical and serial inventory.

[8]The recession decreased Old City's revenues more than New City's revenues for two main reasons. First, firms were more affected by the recession in Old City (with a traditional economy) than in New City (with a high technology and service-oriented economy). Second, sales tax revenues constituted a larger proportion of the overall revenues in Old City than in New City.

[9]In particular, cities suffered from increases in state prison booking fees (1991), property tax collection service charges (1991), the loss of the cities' share of cigarette taxes (1991), a decrease of 50% of non-parking traffic fines (1991), shifts of 9% of general fund property tax and of 15% of redevelopment agency tax increment from cities to the state (1992), and increases in water purchase and pumping charges (1992).

[10]For example, some department managers counted six or seven hours of work as a full day, whereas others calculated it as three-fourths or seven-eights of a day, respectively.

[11]The authors thank a reviewer for suggesting this idea.

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