

Examining the Relationship Between Learning Organization Characteristics and Change Adaptation, Innovation, and Organizational Performance

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The main purpose of this exploratory study was to examine the relationship between certain learning organization characteristics and change adaptation, innovation, and bottom-line organizational performance. The following learning organization characteristics were found to be the strongest predictors of rapid change adaptation, quick product or service introduction, and bottom-line organizational performance: open communications and information sharing; risk taking and new idea promotion; and information, facts, time, and resource availability to perform one's job in a professional manner.

Organizational leaders and theorists increasingly view learning as a key element in developing and maintaining competitive advantage (Armstrong & Foley, 2003; Baldwin, Danielson, & Wiggenhorn, 1997; DeGeus, 1988; Goh & Richards, 1997; Liedtka, 1996; Nonaka, 1991; Porth, McCall, & Bausch, 1999; Schein, 1993; Senge, 1990a; Slater & Narver, 1995; Stata, 1989). Although organizational learning has been studied for decades (Argyris & Schön, 1978, 1996), a new emphasis on learning has arisen due to rapid changes in the business climate, including uncertain market conditions, increasing complexity, changing demographics, and global competition (Altman & Iles, 1998; Peters, 1987; Probst & Buchel, 1997; Swain, 1999). The view that learning increases competitive advantage has stimulated interest in developing organizations that foster and promote learning. Learning organizations are designed to increase competitiveness through generative learning that is forward looking and reduces the major shocks of change, through close relationships with customers and other key constituents that

allow for mutual adjustment, and through the ability to quickly reconfigure and reallocate resources based on environmental change (Slater & Narver, 1995).

Recently, there has been a call to redefine the role of human resources in ways that increase its strategic impact on organizational competitiveness and success (Griego, Geroy, & Wright, 2000; Ulrich, 1997a, 1997b, 1999). Human resource development (HRD) professionals are being asked to take a leadership role in transforming organizations in ways that foster and promote learning. Creating a learning company requires an understanding of the learning organization concept and its relationship to desired organizational outcomes.

Review of the Literature

We begin by examining the literature.

Distinguishing Between Organizational Learning and Learning Organizations. The terms *organizational learning* and *learning organization* have been used interchangeably in the past (Ortenblad, 2001). As a result, confusion has attended the use of these terms (Burgoyne, 1999; Kiechel, 1990). However, attempts have been made to clarify and distinguish the two concepts (Argyris, 1999; Argyris & Schön, 1996; DiBella, 1995; Easterby-Smith & Araujo, 1999; Finger & Brand, 1999; Griego et al., 2000; Marquardt, 1996; Marsick & Watkins, 1994; West & Burnes, 2000; Yang, Watkins, & Marsick, 2004; Tsang, 1997). Three normative distinctions between organizational learning and the learning organization have been identified in the literature (Ortenblad, 2001). First, organizational learning is viewed as a process or set of activities, whereas the learning organization is seen as a form of organization (Tsang, 1997). Second, some authors hold the view that learning takes place naturally in organizations, whereas it requires effort to develop a learning organization (Dodgson, 1993). Third, the literature on organizational learning emerged from academic inquiry, while the literature on the learning organization developed primarily from practice (Easterby-Smith, 1997). Finally, Ortenblad (2001) suggests that two additional factors should be added to the list to help differentiate the two concepts: distinctions based on who learns (Cook & Yanow, 1993; Jones, 1995; Kim, 1993) and on the location of the knowledge (Blackler, 1995). In organizational learning, the focus is on individual learners, whereas in the learning organization, it is on learners at the individual, group, and organizational levels. In organizational learning, knowledge is viewed as residing in individuals, while it is viewed as residing in individuals and in the organizational memory in learning organizations.

Theoretical Influences. Based on their review of the literature, Altman and Iles (1998) describe four theoretical streams of influence that have helped to shape the concept of the learning organization. The first is *strategic management*. Strategic management changed the focus from the external environment to viewing internal resources, such as human potential and core competencies,

as key sources of competitive advantage (Barnes, 1991; Gagnon, 1999; Grant, 1991; Hamel & Prahalad, 1994). A second theoretical influence is *systems theory*, which supports the view that organizations are dynamic, open systems (Ackoff, 1981; Forrester, 1968; Senge, 1990a). *Psychological learning theory*, including the concept of learning levels (Argyris & Schön, 1978, 1996; Swieringa & Wierdsma, 1992), is a third source of influence. The *study of organizational context*, including the impact of structure and culture on learning, emerged from organizational sociology as a fourth theoretical influence.

Defining the Learning Organization. Since the term *learning organization* was popularized by Peter Senge in 1990, definitions have proliferated in the literature (Calvert, Mobley, & Marshall, 1994; Campbell & Cairns, 1994; Coopey, 1995; Daft & Marcic, 1998; Jashapara, 1993; Loermans, 2002; McGill, Slocum, & Lei, 1993; Sankar, 2003). Three definitions that stress the power of learning to transform vision into action are repeatedly cited:

[A learning organization] facilitates the learning of all its members and continuously transforms itself [Pedler, Burgoyne, & Boydell, 1991, p. 1].

[A learning organization is] where people continually expand their capacity to create results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together [Senge, 1990a, p. 3].

[A learning organization is] skilled at creating, acquiring and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights [Garvin, 1993, p. 80].

Nevertheless, reviews of the literature reveal a lack of clarity regarding the learning organization concept. Ortenblad (2002) notes that only a few authors (Argyris, 1999; DiBella, 1995; Easterby-Smith & Araujo, 1999) have attempted to create learning organization typologies. In his survey of the literature and practitioner beliefs, Ortenblad (2002) identified four perspectives used to understand what a learning organizations is—that is, its ontology: organizational learning, learning at work, learning climate, and learning structure. He also identifies some examples of mixed understandings that take a more holistic view and involve more than one of the perspectives (Pedler, Burgoyne, & Boydell, 1991; Watkins & Marsick, 1993). Moilanen (2001) also notes the more holistic perspective evident in the work of Mayo and Lank (1994) and of Senge (1990a, 1990b).

DiBella (1995) identified three orientations in the literature that relate to how learning organizations can be achieved. The first is the normative orientation that views learning as happening only under certain conditions. In this orientation, a learning organization is determined by an internal set of

conditions that ensure learning and are intentionally pursued. The second orientation is developmental. It views learning organizations as developing and evolving over time. DiBella also identified a third orientation, capability, which views all learning styles as legitimate and does not prescribe learning organization characteristics. It views learning as embedded in the culture and structure of the organization.

Various models of learning organizations have developed based on the theoretical roots and perspectives held by different authors. Altman and Iles (1998) identify two models that are prevalent in the literature. The characteristics model of the learning organization identifies the essential attributes or characteristics of a learning organization (Beckhard & Pritchard, 1992; McGill et al., 1993; Pedler et al., 1991). The phase or stage model views the development of a learning organization as an evolving process (Garvin cited in Appelbaum & Goransson 1997; Jones & Hendry, 1992, 1994; Torbert, 1994). These models support the orientations that DiBella identified.

The study reported here takes a holistic theoretical view that draws on the learning concepts of Argyris and Schön (1978, 1996) and views structure and culture as important dimensions of a learning organization (Senge, 1990a). It employs a characteristics model (Altman & Iles, 1998) of the learning organization and incorporates learning organization characteristics that are associated with the dimensions of structure and culture.

Learning Organization Characteristics

Many studies of learning organizations have attempted to diagnose the characteristics of learning organization (Armstrong & Foley, 2003; Goh, 1998; Griego, Geroy, & Wright, 2000; Pedler et al., 1991; Phillips, 2003; Rowden, 2001; Slater & Narver, 1995). Although different authors stress different elements, the characteristics of the learning organization incorporated in this study have been proposed as important features by several authors:

- Open communications (Appelbaum & Reichart, 1998; Gardiner & Whiting, 1997; Phillips, 2003; Pool, 2000)
- Risk taking (Appelbaum & Reichart, 1998; Goh, 1998; Richardson, 1995; Rowden, 2001)
- Support and recognition for learning (Bennett & O'Brien, 1994; Griego et al., 2000; Wilkinson & Kleiner, 1993)
- Resources to perform the job (Pedler et al., 1991)
- Teams (Appelbaum & Goransson, 1997; Anderson, 1997; Goh, 1998; Salner, 1999; Strachan, 1996; Senge 1990a)
- Rewards for learning (Griego et al., 2000; Lippitt, 1997; Phillips, 2003)
- Training and learning environment (Gephart, Marsick, Van Buren, & Spiro, 1996; Goh, 1998; Robinson, Clemson, & Keating, 1997)
- Knowledge management (Loermans, 2002; Selen, 2000)

Instruments have been developed to identify the characteristics that can be used to diagnose whether an organization is, or is becoming, a learning organization and to study learning organizations along different dimensions (Goh & Richards, 1997; O'Brien, 1994; Phillips, 2003; Marquardt, 1996; Marsick & Watkins, 1999; Mayo & Lank, 1994; Pedler et al., 1991; Pedler, Boydell, & Burgoyne, 1988; Tannenbaum, 1997). Nevertheless, there are still relatively few tools that have received adequate scientific testing for reliability and validity (Moilanen, 2001; Nonaka, Byosiere, Borucki, & Konno, 1994).

The Relationship of Characteristics and Organizational Outcomes

Some authors believe that adaptation to change is insufficient to maintain organizational competitiveness. They stress generative learning that leads to innovation as a defining characteristic of the learning organization (Gardiner & Whiting, 1997; McGill et al., 1993; Senge, 1990a), and they view innovation as an important outcome and benefit of the learning organization (Porth et al., 1999; Teare & Dealty, 1998). Others argue that both outcomes, adaptation as well as innovation, are needed for organizations to succeed (Appelbaum & Reichart, 1998; Fiol & Lyles, 1985; Armstrong & Foley, 2003). Regardless of which outcomes are deemed most important, there is little empirical evidence in the literature that shows how the characteristics of learning organizations affect organizational outcomes (Jashapara, 2003). Some authors have begun to address this lack of evidence. For example, Ellinger, Ellinger, Yang, and Howton (2002) and Jashapara (2003) found positive relationships between learning organization characteristics and organizational performance. The study examined here is designed to add to the base of empirical evidence regarding the relationship between learning organization characteristics and organizational outcomes.

Purpose of the Study

Several authors cite gaps in the research on learning organizations: lack of sound conceptualization (Heraty & Morley, 1995), lack of empirical basis for influential models (Altman & Iles, 1998), overall lack of empirical research (Boyle, 2002; Jashapara, 2003; Thomsen & Hoest, 2001; Tsang, 1997), and reliance on anecdotal evidence of success and the overuse of nonrigorous case studies (Easterby-Smith, 1997).

Given these limitations of learning organization research, the main purpose of this study is to address the gap in empirical research by examining the relationship between learning organization characteristics (open communications, risk taking, support and recognition for learning, resources to perform the job, teams, rewards for learning, training and learning environment, and knowledge management) and the organizational outcomes of change adaptation, innovation, and bottom-line performance. Change adaptation is

defined in terms of the extent to which the organization can adapt to changes rapidly. Innovation is defined as the extent to which the organization can introduce new products or services quickly and easily. Organizational performance is defined in terms of quality, productivity, profitability, organizational competitiveness, and employee commitment indicators.

Research Questions

The study seeks to answer the following research questions:

- To what extent are the identified learning organization characteristics associated with rapid change adaptation?
- To what extent are the identified learning organization characteristics associated with the innovation indicator of quick product or service introduction?
- To what extent are the identified learning organization characteristics associated with bottom-line organizational performance?

Research Method

Although the study uses a standard quantitative survey research design (Alreck & Settle, 1995), we are aware that the positivist paradigm has been criticized by adherents of action science (Argyris & Schön, 1989; Argyris, Putnam, & Smith, 1985). Therefore, an internal and external research team was employed to create a more open relationship between researchers and those researched, and the research goals included both the discovery of new knowledge and the improvement of the organizations studied.

Sample. This study involved the participation of four different organizations in the service and manufacturing industries, and data collection occurred at the individual level. More specifically, the prospective participants of this study consisted of the entire population of the information technology division of a large auto manufacturer (300 employees) as well as the case management division of a health care insurance organization (256 employees). Furthermore, this study involved the participation of the entire workforce of two manufacturing facilities of two different organizations (189 and 60 employees, respectively) in the auto parts industry.

To increase the likelihood of a high response rate, the anonymous surveys were administered internally by the corresponding human resource (HR) or organizational development (OD) manager of the organization, who assured the employees of complete confidentiality. Moreover, three of the four organizations offered their employees the opportunity to win a monetary reward, which ranged from \$50 to \$100, for participation. The incentive was distributed after a random drawing of completed raffle tickets, which the participants provided on returning their survey. The response rate reflecting each organization is depicted in Table 1. Table 1 also includes the overall response, 71.9 percent. Given the

Table 1. Response Rates of Participating Organizations

<i>Organization</i>	<i>Response Rate</i>
IT division of auto manufacturer	66% (198/300)
Case management division of a health care insurance organization	75% (192/256)
Auto parts manufacturer A	70.9% (134/189)
Auto parts manufacturer B	91.7% (55/60)
Overall response rate	71.9% (579/805)

high response rate, as well as the affirmative comments of the internals with regard to the degree of agreement between the obtained responses and observed employee behavior and climate in the organization, it was determined that the provided responses were not prone to nonresponse bias.

In terms of roles in the organization, 2.2 percent of all respondents were senior managers, 5.4 percent middle managers, 10.1 percent supervisors, 38.5 percent salaried professionals, 5.2 percent administrative personnel, and 26.1 percent hourly employees. Their educational experiences ranged from high school (31.8 percent) to associate degree (22.6 percent), undergraduate degree (31.2 percent), and graduate degree (12.2 percent). Fifty-five percent of the respondents were male and 45 percent female.

Instrument. The instrument of this study consisted of a third-generation 108-Likert-item questionnaire, which was designed to assess the organization in terms of learning organization, learning transfer, Total Quality Management (TQM), and sociotechnical system (STS) dimensions and performance indicators. Although several scales were designed specifically for this and other studies, many of the dimensions and indicators were assessed with scales that were described in previous literature or research (Buckingham & Coffman, 1999; Hackman & Oldham, 1980; Lindsay & Petrick, 1997; Macy & Izumi, 1993; Mohanty, 1998; Pasmore, 1988; Whitney & Pavett, 1998) and tested in subsequent studies for construct validity and reliability (Kontoghiorghes, 2001a, 2001b, 2002, 2003, 2004; Kontoghiorghes & Bryant, 2004; Kontoghiorghes & Gudgel, 2004; Kontoghiorghes & Hansen, 2004, Kontoghiorghes & Dembeck, 2001).

The scales used were designed to capture data at both the individual and organizational levels. Examples of such scales are:

“Continuous learning by all employees is a high business priority in this company.”

“People in this company freely share their knowledge with others.”

“Risk taking is expected in this organization.”

“I am always satisfied with the quality of work output I receive from my fellow workers.”

“I always feel motivated to learn during training.”

The instrument used a six-point scale that ranged from Strongly Disagree to Strongly Agree. The first version of the questionnaire, which consisted of

99 Likert items, was originally pilot-tested on a group of fifteen participants for clarity. Furthermore, a group of seven experts who held a doctorate or were candidates for a doctorate in the OD, human HRD, or quality management areas reviewed the instrument for content validity. These experts were either well-known scholars or experienced consultants in the HRD field. On revision, the instrument was administered to a group of 129 members of four different organizations. Reliability tests were conducted, and the instrument was further refined and expanded. In particular, items with low reliabilities and low factor loadings in relation to their corresponding constructs were replaced. The threshold used for factor loadings was 0.40. In its final format, the instrument consisted of 108 Likert items. The overall reliability of the instrument was measured in terms of coefficient alpha and was found to be 0.98. In all, the questionnaire attempts to determine the extent to which the organization is functioning as a high-performance system and according to learning organization, TQM, and STS theory and principles. Again, only items pertaining to the earlier described learning organization dimensions are analyzed in this study.

Data Analysis. After the data from the participants were collected, the research questions of this study were answered through the use of a principal components analysis (PCA) in conjunction with multiple regression and correlational analyses. More specifically, the PCA that used a varimax rotation was used to determine if the instrument was measuring the dimensions it was designed to measure and therefore empirically construct validate the learning organization dimensions investigated by the study. Although common factor analysis and PCA “often yield similar results” (Stevens, 1986, p. 338), an advantage of PCA is that the produced components are orthogonal and thus uncorrelated. Hence, by relying on principal components instead of common factors, the problem of multicollinearity is eliminated when building multiple regression models (Stevens, 1986). For this study, the criterion used in order to determine how many components to retain is that of Kaiser (only components whose eigenvalues are greater than 1 are retained). Finally, the internal homogeneity of each factor was determined by calculating coefficient alpha. If coefficient alpha was found to be above 0.70, the factor was deemed reliable and exhibiting internal consistency at an acceptable level.

In terms of regression analysis, stepwise regression was the selection method used when building the regression models for the dependent variables of rapid change adaptation and quick product or service introduction. Briefly, in stepwise regression, the first predictor entered into the model is the one that has the highest zero-order correlation with the dependent variable. The next predictor selected by the regression equation is the one that has the largest semipartial correlation with the dependent variable and thus produces the greatest increment to the multiple correlation R^2 . The third predictor entered into the model is the one that has the highest semipartial correlation with the dependent variable after partialing out the first two variables already in the model. This process continues until a predictor that makes no significant contribution to the regression model is found, and the selection procedure

is therefore terminated. It is important to note that at every step of the selection process, tests are performed to determine the usefulness of each predictor already in the model. Predictors that are found to no longer make a significant contribution toward prediction are removed from the model. For this study, the *F*-to-enter and *F*-to-remove values used were 0.05 and 0.01, respectively. It should be noted that stepwise regression is particularly useful in exploratory studies, especially when the researcher has no preconceived ideas with regard to the importance or predictive utility of each predictor. The importance of each predictor is derived through a mathematical maximization procedure, which precludes any researcher bias.

As far as the last research question is concerned, which attempts to describe the extent to which identified learning organization characteristics are associated with bottom-line organizational performance, given the high number of performance measures investigated, this was answered through a correlational analysis. The analysis provided a brief synopsis of the type of association between the investigated learning organization factors and performance indicators.

Results and Findings

The results of the statistical analyses are depicted in Tables 2 through 9.

Principal Component Analysis. The results of the PCA as well as the reliability of each factor are presented in Table 2. As shown, the PCA that used a varimax rotation produced an eight-factor solution that accounted for 60.9 percent of the total variance. The sample size used for the analysis was 516, for which the critical value for significant loadings was calculated at |0.23| (Stevens, 1986). The variables comprising each factor as well as the corresponding factor loadings are depicted in Table 3.

Table 2. Principal Component Analysis and Reliability Results of Learning Organization Dimensions

<i>Factor</i>	<i>Eigenvalue</i>	<i>Variance (%)</i>	<i>Cronbach's Alpha</i>
Open Communications and Information Sharing	4.943	11.495	0.89
Risk Taking and New Idea Promotion	3.470	8.069	0.84
Support and Recognition for Learning and Development	3.327	7.736	0.84
Information, Facts, Time, and Resource Availability to Perform Job in a Professional Manner	3.246	7.549	0.83
High-Performance Team Environment	3.121	7.257	0.81
Rewards for Learning, Performance, and New Ideas	2.916	6.781	0.84
Positive Training Transfer and Continuous Learning Climate	2.887	6.715	0.77
Knowledge Management	2.264	5.265	0.63

Table 3. Factor Loadings of Learning Organization Constructs (N = 516)

<i>Item and Factor Description</i>	1	2	3	4	5	6	7	8
1. Open Communications and Information Sharing								
Constant communications across levels or between departments	0.65	0.14	0.03	0.28	0.25	0.14	0.14	0.00
Participative organization	0.65	0.30	0.16	0.24	0.01	0.14	0.14	0.13
Managers and supervisors share information openly	0.64	0.18	0.24	0.02	0.19	0.34	0.10	0.11
Business information is shared with employees	0.61	0.21	0.13	0.10	0.13	0.34	0.09	0.14
High degree of employee involvement	0.59	0.23	0.10	0.18	0.23	0.14	0.14	0.24
No boundary interference between units to solve joint problems	0.57	0.19	0.05	0.44	0.16	0.06	0.08	-0.02
Organizational policies do not restrict innovation	0.55	0.28	0.04	0.26	0.15	0.04	0.06	0.08
2. Risk Taking and New Idea Promotion								
Risk taking is expected	0.21	0.77	0.14	0.04	0.13	0.03	0.03	0.15
People who take risks and fail are not punished	0.19	0.73	0.09	0.19	0.15	0.15	0.00	0.06
Innovators get ahead in the organization	0.33	0.66	0.08	0.21	0.08	0.14	0.19	0.12
New ideas are constantly sought and tried	0.29	0.61	0.15	0.14	0.21	0.20	0.17	0.10
3. Support and Recognition for Learning and Development								
Praised and recognized by supervisor when applying new learning	0.08	0.13	0.79	0.05	0.11	0.18	0.19	0.02
Strong supervisory encouragement for new learning	0.14	0.06	0.76	0.14	0.09	-0.07	0.08	0.27
Praised and recognized when doing a good job	0.06	0.37	0.57	0.15	0.19	0.38	0.07	0.00
Encouragement for personal development	0.39	0.14	0.56	0.00	0.09	0.17	0.28	-0.04

Supervisor expects application of new learning	0.08	0.09	0.53	0.04	0.05	-0.16	0.51	0.19
Have learning and growth opportunities	0.27	0.07	0.44	0.09	0.17	0.19	0.16	0.34
Praised and recognized by coworkers when applying new learning	-0.02	-0.04	0.40	0.07	0.38	0.26	0.28	0.05
4. Information, Facts, Time, and Resource Availability to Perform Job in a Professional Manner								
Have materials and equipment to do work right	0.21	0.12	0.15	0.78	0.13	0.06	0.08	0.10
Have facts and information needed to do a good job	0.22	0.18	0.18	0.73	0.09	0.12	0.11	0.18
Have ample time to perform job in a professional manner	0.21	0.07	0.00	0.67	0.09	0.33	0.11	0.09
People meet each other's needs	0.27	0.38	-0.04	0.50	0.27	0.14	0.26	-0.01
5. High-Performance Team Environment								
People are willing to help the organization succeed	0.19	0.22	-0.01	0.02	0.73	0.11	0.07	0.13
People help one another without being told to do so	0.37	0.13	0.18	0.10	0.72	0.05	-0.06	0.00
Coworkers committed to quality work	-0.04	0.10	0.14	0.28	0.59	0.19	0.23	0.08
Team members are committed to one another's success	0.42	0.17	0.24	0.17	0.55	0.21	0.06	0.06
Member of a self-directed work team	0.29	0.09	0.17	0.09	0.47	-0.15	0.16	0.12
People freely share their knowledge with others	0.42	0.13	0.10	0.15	0.45	0.10	0.03	0.20
6. Rewards for Learning, Performance, and New Ideas								
Receive extrinsic rewards when applying new learning	0.43	0.07	0.11	0.08	0.07	0.67	0.22	0.10

(Continued)

Table 3. Factor Loadings of Learning Organization Constructs (N = 516) (Continued)

<i>Item and Factor Description</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>
Receive fair pay for the work I do	0.07	0.13	-0.01	0.38	0.14	0.59	-0.16	0.21
Learning is well rewarded	0.48	0.15	0.16	0.12	0.11	0.59	0.34	0.08
Outstanding performance is quickly recognized	0.29	0.31	0.26	0.23	0.12	0.52	0.08	0.04
New ideas are rewarded	0.33	0.37	0.15	0.17	0.10	0.51	0.13	0.00
7. Positive Training Transfer and Continuous Learning Climate								
Held accountable for training received	0.19	0.14	0.12	0.02	0.00	0.04	0.72	-0.04
Feel motivated to learn during training	0.02	-0.04	0.19	0.14	0.25	0.14	0.61	0.21
Training received is similar to performed tasks	0.11	0.06	0.22	0.11	0.07	0.15	0.49	0.36
Continuous learning is a high business priority	0.33	0.20	0.19	0.20	0.00	0.14	0.49	0.22
Feel motivated to transfer learning back to the job	0.03	0.05	0.33	0.09	0.19	-0.04	0.43	0.34
Employees committed to continuous learning	0.24	0.34	0.00	0.35	0.25	0.27	0.42	0.08
8. Knowledge Management								
Encouraged and expected to manage own learning	0.13	0.22	0.16	0.00	-0.01	0.07	0.04	0.70
Have all necessary skills and knowledge to perform job	-0.01	-0.10	-0.01	0.16	0.22	0.01	0.22	0.60
IT use to capture and distribute knowledge	0.19	0.30	0.10	0.14	0.06	0.26	0.17	0.54
Have influence over my work	0.26	0.14	0.21	0.37	0.16	-0.03	0.03	0.41

Note: Bold type indicates an item was included in the corresponding dimension.

In short, the first rotated factor, which accounted for 11.49 percent of the total variance, had the highest factor loadings from seven variables that together described a participative system, which is characterized by constant and open communications among units, levels, and employees. This factor was thus named the Open Communications and Information Sharing factor. The second rotated factor, which accounted for 8.07 percent of the total variance, was composed of variables that collectively characterize the extent to which the organization promotes risk-taking behavior as well as generation and trial of new ideas. This factor was thus called Risk Taking and New Idea Promotion.

The third factor generated dealt with the extent to which the employees receive encouragement and support for learning and growth opportunities, as well as praise and recognition when applying new learning on the job. This factor accounted for 7.74 percent of the total variance and was called Support and Recognition for Learning and Development. The fourth factor, which accounted for 7.55 percent of the total variance, pertained to the extent to which the employees have all materials, equipment, facts, information, support, and time in order to perform their job in a professional manner. This factor was therefore labeled Information, Facts, Time, and Resource Availability to Perform Job in a Professional Manner. The fifth factor consisted of variables that defined the extent to which the employee was functioning in a team-based environment within which team members are truly committed to the success and growth of each other and are willing to put in effort above the minimum required. This factor, which was called High-Performance Team Environment, accounted for 7.26 percent of the total variance.

The last three factors generated by the analysis were all learning-related dimensions. Factor 6, which accounted for 6.78 percent of the total variance, grouped together the variables that reflected the extent to which the employees were rewarded by the organization for their learning, new ideas, and performance. This factor was thus labeled Rewards for Learning, Performance, and New Ideas. The seventh factor dealt with the extent to which the employee was functioning in an environment that was conducive to training transfer and continuous learning. This factor was called Positive Training Transfer and Continuous Learning Climate. The last factor produced by the PCA was composed of variables that described the extent to which the employee was expected to manage his or her own learning, had all necessary skills and knowledge to perform the job at the expected level, had influence over the things that determine how the work is done, as well as the extent to which information technologies were used by the organization to capture and distribute important knowledge to those who need it. The last factor was therefore named Knowledge Management. Factors 7 and 8 accounted for 6.71 percent and 5.26 percent of the total variance, respectively.

In all, the PCA and varimax rotation produced an eight-factor solution that was successful in differentiating between the assessed dimensions and thus construct validated the scales used. Moreover, the produced solution displays an

unambiguous pattern of item loadings and provides no evidence of cross-loadings. As shown in Table 2, almost all factors had a reliability coefficient in the 0.77 to 0.89 range, which provides evidence of internal factor homogeneity. The only exception was the reliability coefficient of the Knowledge Management factor (coefficient alpha = 0.63), which is below the common threshold of 0.70. Hence, results pertaining to this factor should be viewed with caution. The overall alpha for all forty-three learning organization variables included in this article was measured at 0.95. The means, standard deviations, and correlations of each factor with the dependent variables are summarized in Table 4.

Stepwise Regression Analysis for the Rapid Change Adaptation Variable. As shown in Table 5, the stepwise regression model of rapid change adaptation incorporated in its design six of the eight produced factors, which accounted for 50.3 percent of the total variance. At 1.2 percent, the shrinkage of the produced model is very small and thus indicative of a cross-validated regression model. As expected, the tolerance values of 1.000 in Table 6 ascertain the nonexistence of multicollinearity in the regression model. In short, the tolerance value reflects the proportion of the predictor's variance not accounted for by the other independent variables in the regression model.

Table 4. Means, Standard Deviations, and Correlations with Dependent Variables

<i>Learning Organization Factor</i>	<i>Number of Items</i>	<i>Mean</i>	<i>SD</i>	<i>Rapid Change Adaptation Correlation</i>	<i>Quick Product or Service Introduction Correlation</i>
1. Open Communications and Information Sharing	7	3.51	1.30	0.486**	0.362**
2. Risk Taking and New Idea Promotion	4	3.74	1.29	0.314**	0.309**
3. Support and Recognition for Learning and Development	7	4.20	1.26	0.034	0.007
4. Information, Facts, Time, and Resource Availability to Perform Job in a Professional Manner	4	4.07	1.27	0.279**	0.373**
5. High-Performance Team Environment	6	4.00	1.22	0.215**	0.196**
6. Rewards for Learning, Performance, and New Ideas	5	3.45	1.37	0.181**	0.265**
7. Positive Training Transfer and Continuous Learning Climate	6	4.42	1.15	0.123**	0.111*
8. Knowledge Management	4	4.44	1.18	0.014	0.069

*Statistically significant at $p < 0.05$. **Statistically significant at $p < 0.01$.

Table 5. Stepwise Regression Model of Rapid Change Adaptation

<i>Modeled</i>	<i>R</i>	<i>R²</i>	<i>Adjusted R²</i>	<i>Standard Error of the Estimate</i>
1. Open Communications and Information Sharing	.486	.236	.234	1.22
2. Risk Taking and New Idea Promotion	.579	.335	.333	1.14
3. Information, Facts, Time, and Resource Availability to Perform Job in a Professional Manner	.639	.409	.405	1.07
4. High-Performance Team Environment	.675	.456	.451	1.03
5. Rewards for Learning, Performance, and New Ideas	.698	.487	.482	1.00
6. Positive Training Transfer and Continuous Learning Climate	.709	.503	.497	0.99

Note: Dependent variable: Rapid change adaptation; $N = 511$. Method: Stepwise (Criteria: Probability-of- F -to-enter $\leq .050$, Probability-of- F -to-remove $\geq .100$).

Accounting for 23.6 percent of the total variance, the Open Communications and Information Sharing factor was found to be by far the strongest predictor of rapid change adaptation. Risk Taking and New Idea Promotion was the second factor selected by the model and accounted for 9.9 percent of the total variance. Resource Availability to Perform Job in a Professional Manner was found to be the third strongest predictor of rapid change adaptation and accounted for 7.4 percent of the total variance. The remaining factors entered into the model were High-Performance Team Environment, Rewards for Learning, Performance, and New Ideas, and Positive Training Transfer and Continuous Learning Climate. These three factors accounted for 4.7 percent, 3.2 percent, and 1.5 percent of the total variance, respectively. The factors that were not selected by the regression model were Support and Recognition for Learning and Development as well as Knowledge Management.

Stepwise Regression Analysis for the Quick Product or Service Introduction Variable. The results of the stepwise regression analysis for quick product or service introduction are shown in Tables 7 and 8. According to the data presented in Table 7, the seven factors selected by the model accounted for 48.3 percent of the total variance of the dependent variable. At 1.4 percent, the very small shrinkage once again provides cross-validation evidence for the regression model. The tolerance values of 1.000 in Table 8 once again indicate the regression model is free of multicollinearity problems.

It is interesting to note that the three strongest predictors of quick product or service introduction are identical to those of rapid change adaptation. The only difference is the order with which they appear in each model. In particular, Information, Facts, Time, and Resource Availability to Perform Job in a Professional Manner, or the extent to which employees are given

Table 6. Beta Coefficients for Rapid Change Adaptation Regression Model

<i>Model</i>	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>			<i>Collinearity Statistics</i>		
	<i>B</i>	<i>Standard Error</i>	<i>Beta</i>	<i>t</i>	<i>Significance</i>	<i>Tolerance</i>	<i>Variance Inflation Factor</i>	
(Constant)	3.148	.044		72.07	.000			
1. Open Communications and Information Sharing	.672	.044	.483	15.38	.000	1.000		1.000
2. Risk Taking and New Idea Promotion	.438	.044	.314	10.00	.000	1.000		1.000
3. Information, Facts, Time, and Resource Availability to Perform Job in a Professional Manner	.381	.044	.272	8.671	.000	1.000		1.000
4. High-Performance Team Environment	.300	.044	.215	6.858	.000	1.000		1.000
5. Rewards for Learning, Performance, and New Ideas	.248	.044	.178	5.668	.000	1.000		1.000
6. Positive Training Transfer and Continuous Learning Climate	.172	.044	.124	3.951	.000	1.000		1.000

Table 7. Stepwise Regression Model of Quick Product or Service Introduction

<i>Model</i>	<i>R</i>	<i>R</i> ²	<i>Adjusted R</i> ²	<i>Standard Error of the Estimate</i>
1. Information, Facts, Time, and Resource Availability to Perform Job in a Professional Manner	.368	.136	.134	1.22
2. Open Communications and Information Sharing	.514	.264	.261	1.13
3. Risk Taking and New Idea Promotion	.600	.360	.356	1.05
4. Rewards for Learning, Performance, and New Ideas	.654	.428	.424	0.99
5. High-Performance Team Environment	.683	.467	.462	0.96
6. Positive Training Transfer and Continuous Learning Climate	.692	.479	.473	0.95
7. Knowledge Management	.695	.483	.476	0.95

Note: Dependent variable: Quick product or service introduction; $N = 515$. Method: Stepwise (Criteria: Probability-of- F -to-enter $\leq .050$, Probability-of- F -to-remove $\geq .100$). $F = 67.80$, $p < 0.001$.

the materials, equipment, facts, information, and coworker support they need to perform their job effectively, accounted for 13.4 percent of the total variance and was thus found to be the strongest predictor of the dependent variable. Accounting for 12.9 percent of the total variance, Open Communications and Information Sharing was found to be the second strongest predictor. The third predictor selected by the regression model was Risk Taking and New Idea Promotion, which accounted for 9.5 percent of the total variance. The remaining factors that were selected by the regression model were Rewards for Learning, Performance, and New Ideas; High-Performance Team Environment; Positive Training Transfer and Continuous Learning Climate; and Knowledge Management. These factors accounted for 6.8 percent, 3.9 percent, 1.2 percent, and 0.4 percent of the total variance, respectively. Once again, the factor pertaining to Support and Recognition for Learning and Development was not selected by the regression model.

Pearson Correlations Between Learning Organization Factors and Organizational Performance. The Pearson correlations between the generated eight factors and indicators of organizational performance are depicted in Table 9. As shown, the eight factors were correlated with indicators pertaining to rapid change adaptation, quick product or service introduction, organizational competitiveness, profitability, productivity, quality, and employee commitment. The correlations ranged from -0.02 to 0.52 , with the majority of them being in the low to moderate range. Taking into consideration the average correlation of each factor with the respective performance indicators, it can be concluded that the learning organization factors that are more highly associated with organizational

Table 8. Beta Coefficients for Quick Product or Service Introduction Regression Model

<i>Model</i>	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>		<i>Significance</i>	<i>Tolerance</i>	<i>Variance Inflation Factor</i>
	<i>B</i>	<i>Standard Error</i>	<i>Beta</i>	<i>t</i>			
(Constant)	3.605	.042		86.36	.000		
1. Information, Facts, Time, and Resource Availability to Perform Job in a Professional Manner	.482	.042	.368	11.54	.000	1.000	1.000
2. Open Communications and Information Sharing	.470	.042	.359	11.24	.000	1.000	1.000
3. Risk Taking and New Idea Promotion	.405	.042	.309	9.682	.000	1.000	1.000
4. Rewards for Learning, Performance, and New Ideas	.342	.042	.261	8.196	.000	1.000	1.000
5. High-Performance Team Environment	.259	.042	.198	6.194	.000	1.000	1.000
6. Positive Training Transfer and Continuous Learning Climate	.142	.042	.108	3.393	.001	1.000	1.000
7. Knowledge Management	.085	.042	.065	2.031	.043	1.000	1.000

Table 9. Pearson Correlations of Learning Organization Factors and Performance Indicators

	Open Communications and Information Sharing	Resource Availability	Risk Taking and New Idea Promotion	High- Performance Team Environment	Rewards for Learning, Performance, and New Ideas	Positive Training Transfer and Continuous Learning Climate	Support for Learning and Development	Knowledge Management
Rapid change adaptation	.52**	.30**	.31**	.20**	.17**	.14**	.03	.03
Quick product or service introduction	.39**	.41**	.30**	.19	.26**	.12**	.01	.08
Organizational competitiveness	.27**	.25**	.39**	.09**	.11**	.13**	.05	.12**
Profitability	.02	.06	.10*	.15**	.05	.19**	.16**	-.02
Productivity indicators								
Employee output	.17**	.23**	.17**	.40**	.16**	.14**	.14**	-.02
Cost-effective production	.42**	.34**	.29**	.23	.19**	.16**	.04	.09
Quality indicators								
External customer satisfaction	.25**	.37**	.30**	.27**	.18**	.12**	.07	.07
External customer loyalty	.23**	.17**	.22**	.17**	.19**	.16**	.14**	.07
Peer work output satisfaction	.12**	.27**	.21**	.46**	.17**	.17**	.07	.14
Quick reaction to solve unexpected problems	.31**	.34**	.32**	.34**	.17**	-.02	.08	.11*
No rework needed	.35**	.28**	.23**	.22	.16**	.16**	.04	.07
Employee commitment								
Committed to the company	.16**	.12**	.20**	.20**	.16**	.20**	.23**	.17**
Company satisfaction	.30**	.36**	.19**	.15**	.41**	.13**	.20**	.17**
No absenteeism	.28**	.25**	.17**	.18**	.21**	.07	.13**	.01
No turnover	.26**	.31**	.22**	.12	.24**	.02	.06	.05
Average correlation	.27	.27	.24	.22	.19	.13	.10	.08

N = 482. *Significant at the 0.05 level (two-tailed). **Significant at the 0.01 level (two-tailed).

performance are those that pertain to the structural, information systems, and organization culture dimensions.

The factors that were found to exhibit an average correlation of 0.2 or higher with the performance indicators were Open Communications and Information Sharing ($r = 0.27$), Resource Availability ($r = 0.27$), Risk Taking and New Idea Promotion ($r = 0.24$), and High-Performance Team Environment ($r = 0.22$). It is interesting to note that the average correlations between the learning-related dimensions and performance indicators were found to be in the low range. In particular, the average correlation of Positive Training Transfer and Continuous Learning Climate, Support for Learning and Development, and Knowledge Management with the performance indicators were 0.13, 0.10, and 0.08, respectively. The Rewards for Learning, Performance, and Ideas factor was found to exhibit an average correlation of 0.19 with the performance indicators.

By examining the individual correlations in Table 9, one can observe that only 6 out of the possible 120 correlations between the learning organization factors and the performance indicators are above 0.4. Furthermore, only four of the eight factors were found to exhibit a correlation of 0.4 or higher with at least one of the performance indicators. The Open Communications and Information Sharing factor was found to be more highly correlated with rapid change adaptation ($r = 0.52, p < 0.01$) and cost-effective production ($r = 0.42, p < 0.01$). At the same time, the High-Performance Team Environment factor was found to be more highly correlated with peer work output satisfaction ($r = 0.46, p < 0.01$) and employee output ($r = 0.40, p < 0.01$). Finally, the factors of Resource Availability and Rewards for Learning, Performance, and New Ideas exhibited a correlation of 0.41 ($p < 0.01$) with quick product or service introduction and company satisfaction, respectively. It is worth noting that all factors were found to exhibit a low to a very weak association with profitability.

Conclusions and Discussion

In all, the correlational data in conjunction with the results of the regression analyses indicate that the most important learning organization dimensions for change adaptation, quick product or service introduction, and bottom-line organizational performance are those pertaining to the structural, cultural, and information systems of the organization. More specifically, the stepwise regression model for rapid change adaptation identified Open Communications and Information Sharing, Risk Taking and New Idea Promotion, and Resource Availability to be its strongest predictors. Moreover, the statistical analysis identified Resource Availability, Open Communications and Information Sharing, and Risk Taking and New Idea Promotion to be the strongest predictors of quick product or service introduction. The fourth and fifth strongest predictors for

both models, in reverse order, were High-Performance Team Environment and Rewards for Learning, Performance, and New Ideas. Taking into account that these five factors were also found to exhibit the highest average correlations with the fifteen performance indicators in Table 9, it is safe to conclude that organizational interventions that focus on the structural, cultural, and communication system characteristics of the organization will be more likely to produce higher levels of performance, change adaptation, and innovation than those that strictly focus on learning and its application.

Collectively, the three factors that were found to more strongly predict rapid change adaptation and quick product or service introduction reflect the importance of designing participative and open organizational systems. Within such a system, information is openly shared with employees, while constant and open communications across levels and between departments allow joint solutions to problems without boundary interference. Furthermore, the three factors together describe an organizational system that not only provides the employees with all the time, facts, information, and tools they need in order to perform their job in a professional manner, it also gives them the freedom to try new ideas and be risk takers. The latter validates the importance of Argyris's double-loop learning theory and demonstrates how democratic and open systems, which allow employees to think, challenge the operating norms of the organization, be creative, and take risks, ultimately transform themselves into innovative and rapidly adapting entities capable of coping with highly complex and rapidly changing environments.

In a nutshell, the results of this study suggest that organizational designs that are based on the holographic principles of connectivity, redundancy, and self-organization facilitate innovation and rapid change adaptation. An advantage today's organizations have is that through information technologies, they can very easily transform themselves into holographic entities and thus eliminate the bounded rationality that may characterize them. To do so, however, they will need to operate as open and trusting systems capable of adapting participative practices, which promote employee involvement and empowerment. Simply put, open communications, free flow of information, and risk taking do not occur in bureaucratic systems for which information is considered a sacred commodity and deviation from operating norms a serious violation.

Another conclusion that stems from the results of this study is that although learning organization designs facilitate change adaptation and innovation, and thus organizational growth and evolution, they are not as equally effective when it comes to such bottom-line organizational performance as productivity, quality, and profitability. This finding is in agreement with Lawler and Mohrman's assertion (1998) according to which no single approach to management offers a complete system of management. Lawler and Mohrman note that "the challenge for the future is to develop a complete system of management that integrates and goes beyond what is offered by any one of them" (p. 207).

Implications for Practice. The findings of this study have important implications for HRD practice. First, they reinforce the notion that systemic interventions that address a variety and different combinations of learning organization characteristics will be more likely to be successful than interventions that solely focus on singular or a limited number of dimensions. However, the results of this study further imply that when it comes to performance, transforming the structural and cultural dimensions of the learning organization approach should be the first priority. More specifically, the results of this study suggest that transforming the organizational structure into an organic one, and in turn changing the organizational culture accordingly, should be the first critical step when building the learning organization. This is in contrast to the approach typically followed when attempting to build a learning organization. Often enough, creating a continuous learning environment and knowledge dissemination is the primary focus of many learning organization interventions. According to the results of this study, focusing first on such learning organization characteristics as open communications, teamwork, resource availability, and risk taking, and then on building the learning network and continuous learning culture, can make the transformation process faster to produce results. Given that altering the structure of the organization often demands cultural changes as well, the learning organization transformation process could be facilitated further if attention is also paid to such cultural characteristics as trust, experimentation, flexibility, employee participation, and teamwork.

Limitations and Implications for Future Research. Given that the findings of this study are based on a correlational analysis, which in turn was based on self-reported data, no strict causal conclusions can be inferred. The causal direction between the investigated variables could further be established through quasi-experimental or longitudinal research designs. Reliance on more direct or objective measures, such as archival data, interviews with key stakeholders, and direct observations by trained research observers, could also enhance the validity of the conclusions drawn in this study. Furthermore, although this study is based on data gathered from organizations representing different sectors of the industry, replicating this study in other industries and environments will help determine the extent to which the presented results can be generalized to other settings as well. Moreover, the dimensions incorporated in this study are only a subset of all possible ones that can be studied under learning organization theory. Hence, replication of this study with inclusion of more learning organization dimensions may help develop a better conceptual framework with regard to the association between learning organization practices and change adaptation, innovation as well as bottom-line organizational performance.

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