

BUILT TO CHANGE: HIGH-PERFORMANCE WORK SYSTEMS AND SELF-DIRECTED WORK TEAMS – A LONGITUDINAL QUASI-EXPERIMENTAL FIELD STUDY

Barry A. Macy, Gerard F. Farias, Jean-Francois Rosa and Curt Moore

ABSTRACT

This chapter reports on a longitudinal quasi-experimental field study within an organizational design of a global consumer products manufacturer moving toward high-performance work systems (HPWSs) in North America by integrating business centers and self-directed work teams (SDWTs) coupled with 13 other action-levers within an integrated and bundled high-performance organizations (HPOs) re-design. The results of this organizational design effort are assessed using different types and levels of organizational outcomes (hard record data, behavioral, and attitudinal measures) along a 5-year temporal dimension punctuated by multiple time periods (baseline, during, and after). The organization, which was “built to change” (Lawler & Worley, 2006), in this research had already highly superior or “exemplar” (Collins, 2001) levels of organizational performance. Consequently, the real research question

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becomes: "What effect does state of the art organizational design and development have on an exemplar organization?" The study also calls into question the field's ability to truly assess exemplar organizations with existing measures of organizational change and development.

INTRODUCTION

Sustaining positive outcomes in a hyperturbulent and extremely competitive landscape (Bettis & Hitt, 1995) is a challenge that executives face daily with the hope of reaping emerging benefits while sustaining current profits. To comprehend this global and volatile environment, and anticipate future business needs and constraints, executives and their organizations must possess a proactive flexibility that stretches far beyond a simple adjustment to an ever-changing environment (Brown & Eisenhardt, 1997). Moreover, the search for innovative ways to improve organizational performance is central to the work of a large number of scholars and practitioners. At the same time, we live in a "Good to Great" (Collins, 2001) era in which profitable organizations are trying to improve, after having already implemented total quality management (TQM), re-engineering, work teams, six sigma and business process re-design (BPR). For many organizations, other than offshoring to reduce costs, there is not much they can do except to take the leap of faith to greater employee engagement, self-governance, more involvement in decision-making, and other work aspects that characterizes high-performance work systems (HPWS). As Lawler and Worley (2006, p. 3) indicate, "... companies should seek a string of temporary competitive advantages through an approach to organization design that assumes change is normal."

Furthermore, they suggest that organizations should be built (designed) to change on the basis of improved human capital, knowledge creation, and designing organizations with the ability to constantly change. Lawler and Worley (2006, p. 6) further state that "There is a growing evidence that the way [organizations] are organized can in fact provide a competitive advantage."

We too argue that organizations that are able to design HPWS (the bundling and fit of macro- and micro-structures, systems, and processes) are central to providing organizations with the flexibility to adapt to constant change. There is a growing body of evidence (Arnett, Macy, & Wilcox, 2005; Macy & Moore, 2004; Collins, 2001; Farias, 2005; Huselid, 1995; Huselid,

Becker, & Beatty, 2005; Lawler & Worley, 2006) indicating that organizational design is a critical issue for competitive advantage. Our longitudinal field study examines an organization that was “built to change” over a 20-year period, or in other words, that was designed to acquire the capability to change. The main design features used by this changing organization were a business center design coupled with self-directed work teams (SDWTs), themselves coupled with 13 other key action-levers. In essence, this was the organization’s way to design for change.

It seems many organizational change interventions are unsuccessful or less well accepted. Most organizations are built for stability rather than adaptability and flexibility. Organizational leaders have been coached and trained to create organizational stability. Many organizations, except maybe those in the public sector (city, state, and federal governments, most hospitals and care-giving institutions, school systems, etc.) and maybe even energy firms (Exxon-Mobil, Royal Dutch Shell, B.P., etc.), need to be constantly changing their structures, systems, and processes to meet global competition. Eventually, even those in the public sector as well as energy firms will be required in the future to change (as the environment changes) – just not as often nor as radical. Moreover, organizational leaders, as well as rank and file employees, tend to resist change. They have been schooled (mostly at business schools) to design structures, systems, and processes for permanency. Our view, like Lawler and Worley (2006), indicates that leaders and rank and file employees must be involved in designing organizations that will constantly evolve and be built for change.

Our definition of an innovative HPWS is an organization that has successfully bundled and integrated specific sets of design features or action-levers, which are comprised of macro- and micro-organizational structures, systems, processes, technologies, and information/knowledge-sharing mechanisms. Specifically, macrostructures consist of autonomous business units or centers that have been restructured from the front to the backend of the value chain. Microstructures consist of operations with SDWTs along both ends of the value chain – the supply and the demand sides. Within these types of SDWTs, team members perform formalized work tasks (not jobs) and formalized rotated leadership roles within and outside their respective teams. Coupled with the micro operations SDWT structure would be the macro business center and connected process white-collar supply chain SDWTs utilizing coordinators, coaches, team leaders, or resource people instead of supervisors and managers.

Second, organizations that are built to change utilize critical supporting systems, such as multi-skilling, job/task rotation and cross-training,

information and knowledge sharing, and people development systems. Included in these built to change systems would be minimum job/task levels or a common job/task classification system and appropriate innovative pay systems coupled with a qualification/certification/re-certification system.

The third element in an organization that is built to change is its organizational processes. Such processes include employee involvement in decision-making, formalized and rotated leadership roles within the SDWTs, and self-governance. Other processes include direct participation in the organization's design, direct work with suppliers and customers along the value chain, and TQM.

In summary, our definition of HPWSs is one that is *intentionally designed* to change and bring out the best in people, structures, systems, and processes thereby producing organization capability that delivers sustainable leadership and business results. In turn, these bundled design features or action-levers holistically "fit" together to be a competitive advantage and produce superior to exemplar performance. Moreover, these bundled design features that fit together seemingly have great difficulty in being copied. In essence, the relationship between these design features becomes a "competitive advantage" (Black & Boal, 1996). The difficult and complex aspect about designing HPWSs to change is that there is no one design and no one way to do it!

The organizational innovation, organizational transformation, organizational development, organizational design, and change management literatures provide many insights on potentially profitable organizational change alternatives. However, Armenakis and Bedeian (1999, p. 311) observe that the scope of these contributions remains, for now, limited and that "future studies should evaluate content, contextual and process issues so as to make predictions about how and why organizations change." Some authors have raised concerns about the identification and assessment of the fundamental factors required to implement successful organizational change efforts. For example, how do organizations unbundle the various design features and unveil the dynamic "processes and mechanisms responsible for initiating change" (Pettigrew, Woodman, & Cameron, 2001, p. 705). Moreover, "the question of "how" change emerges, develops, continues, and terminates over time remains largely unanswered" (Armenakis & Bedeian, 1999, p. 311). However, responsive to the urging demands from organizations, research studies have mainly reported on specific organizational design change efforts, such as quality circles, BPR, re-engineering, TQM, and six sigma, to name only a few of these design features.

Most practitioners and even some academics believe that TQM, six sigma, re-engineering, and business process design will improve quality and service

while reducing cost and cycle time. The literature on TQM (Deming, 1986) suggests that TQM (now popularly called six sigma) is a way to improve organizational results. However, there have been numerous studies (Fisher, 1992; Gilbert, 1992; Macy & Izumi, 1993; Wruck & Jensen, 1994; Mohrman, Tenkasi, Lawler, & Ledford, 1995; Hackman & Wageman, 1995; Coyle-Shapiro, 1999) that indicate the TQM approach has little to no scientific evidence for organizational improvement. In fact, one meta-analysis study of 1,800 North American organizations from 1961 to 1991 found no evidence of improvement in organizational performance using TQM (Macy & Izumi, 1993).

In contrast to TQM, many consultants and consulting firms have popularized BPR and re-engineering for its organizational benefits. Re-engineering and BPR started with Hammer (1990), in his landmark article in the *Harvard Business Review* (HBR). It was then followed by Davenport (1993), Hammer and Champy (1993), Johansson, McHugh, Pendlebury, and Wheeler (1993), and Mink, Esterheysen, Mind, and Owen (1993). However, even Hammer conceded to only a 30 percent success rate for the use of BPR or re-engineering (Vansina & Taillieu, 1996). Further, scientific evidence on the low success rate of TQM, BPR, and re-engineering can be found in Smith (2002), which indicated that TQM efforts had a success rate of 37 percent, while BPM and re-engineering had only 30 percent. Smith's study indicates that the higher success rate was from strategy deployment (58 percent) and restructuring and downsizing (46 percent). In summary, these highly popularized change efforts (TQM, six sigma, BPR, and re-engineering), designed mostly by large consulting firms and a few academics, are based upon little scientific evidence, and rely more on case studies and anecdotal evidence. Their collective impact on organizational effectiveness seems to be little to none!

Woodman (1989) observes the development of the "high performance-high commitment work systems" (Holbeche, 2005; Pasmore, 1994) as a type of organizational transformation effort that impacts the organization's core. Associated with the HPWS perspective, the implementation of these innovative work systems requires a comprehensive and holistic or bundled design approach that integrates macro- and micro-organizational design perspectives into a single integrated framework in which the interdependence and fit of organizational design features are critical (Becker & Huselid, 1998; Hanna, 1988; Ketchum & Trist, 1992; Lawler, 1996; Nadler & Gerstein, 1992; Pasmore, 1988; Risher & Fay, 1995). The entire organization becomes a "burning platform" on which these different but interdependent design features will be designed to fit altogether to change as suggested by

the HPWS design philosophy. Successful HPWS implementations are all-encompassing, so that the new intricacies formed by technologies, processes, systems, and structures will exhibit the most congruence among the elements and with the external environment (Galbraith, 1977).

These “open system” (Katz & Kahn, 1978; Trist, 1981) organizational design features include “practices such as rigorous selection procedures, internal merit-based promotions, innovative grievance procedures, cross-functional and cross-trained teams, high levels of training, information sharing, participatory mechanisms, group-based rewards, and skill-based pay” (Datta, Guthrie, & Wright, 2005, p. 136). For example, the implementation and results of SDWTs, sometimes considered as a competitive advantage by some organizations (Ault, Walton, & Childers, 1998) are but one of these design features that has drawn the attention of business magazines and case studies as being critical to many firms’ performance (e.g., Procter & Gamble, Harley-Davidson, International Paper, Goodyear, Rohm & Hass, S.C. Johnson and Sons, Colgate, Harman International, etc.).

However, despite the fact that HPWS (sometimes called high-performing organizations – HPOs) and SDWTs have been in the work innovation and change literatures for 20–50 years, they surprisingly remain under the skeptical scrutiny of those claiming that these self-managing teams are an unverified organizational improvement means, or in extreme cases, just another management “fad” (Gibson, Whitney & Tesone, 2001). We identify three issues that provide possible explanation for this skepticism.

First, among the few potential explanations of why the HPWS concept and its open systems value perspective remains weak is the one provided by a review of the different HPWS and SDWTs-related literatures. While some empirical findings exist on some HPWS organizational key design features or action-levers, like the effectiveness of SDWTs, a closer look at more than five decades of research on SDWTs shown in Table 1 reveals that only 19 (from 1951 to 2005) scientific and empirically based studies investigating the effects of SDWTs are available in the organizational innovation, change, design, and development literatures. Furthermore, this lack of scientific evidence is aggravated by weak empirical support of SDWTs positive impact on organizational performance since the results range from “positive” to “no change,” or filling a “mixed bag” that might conclude for no overall significant improvement in organizational performance. Similarly, the vast majority of the literature on HPWS designs has been largely prescriptive and has approached the HPWSs holistic concept mainly by only assessing isolated design features or action-levers; rather than accounting for the overall

Table 1. Summary of Results from Prior Semi-Autonomous and Autonomous Self-Directed Work Teams Studies: 1951–2005.

| Author(s) | Study Description | Organizational Performance Criteria | Results |
|--|--|--|---|
| Trist and Bamforth (1951) | Report of early experiment of socio-technical systems | Group cohesiveness Personal satisfaction Sickness reduction Absenteeism reduction Productivity Sustained over 15 years | Improvement Improvement Improvement Improvement Partial support Partial support |
| Miller (1975) | This was a revisit to one of the first studies in socio-technical design 15 years after it was started | | |
| Gyllenhammar (1977) | The Volvo experiment at Kalmar and Torsland | Productivity Attitudes to the new design Diffusion Quality Cost reduction Attitudes Withdrawal reduction (turnover and absenteeism) | Improvement Improvement Yes Improvement 96% ^a Improvement 80% ^a Improvement 90% ^a Improvement 77% ^a |
| Cummings et al. (1977) | Critique of 58 work innovation studies. Eighty-six percent used autonomy and discretion. Results reported here are on all work innovations | | |
| Trist et al. (1977) | Rushton quality of work life quasi-experiment – coal mining – independent evaluation | Productivity Safety violations reduction Cost reduction Productivity Safety Attitudes Cost-Benefit Productivity | No change Improvement Improvement No change Improvement Improvement Slight improvement Improvement 89% ^b |
| Goodman (1979) | Rushton quality of work life quasi-experiment – coal mining – independent evaluation | | |
| Pasmore, Francis, Haldeman, and Shani (1982) | Review of 134 studies | | |

Table 1. (Continued)

| Author(s) | Study Description | Organizational Performance Criteria | Results |
|-----------------------|---|---|---|
| Pasmore (1988) | 53% of the studies used autonomous teams. | Cost reduction Quality Absenteeism Turnover reduction Safety Attitudes | Improvement 85% ^b Improvement 100% ^b Improvement 86% ^b Improvement 81% ^b Improvement 100% ^b Improvement 100% ^b |
| Wall et al. (1986) | Quasi-experiment – “greenfield” versus “brownfield” site of same company. No changes at brownfield site | Intrinsic job satisfaction Extrinsic job satisfaction Internal work motivation Organizational commitment Mental health Employee turnover Productivity Escape behaviors reduction | Better ^c No change No change No change No change Worse ^d Better ^c Better ^c |
| Beekun (1989) | Meta-analysis of socio-technical design (17 studies) – comparison of SDWTs with other types of teams | Productivity Escape behaviors | No change No change |
| Beekun (1989) | Meta-analysis of socio-technical design (17 studies). Only social change versus social and technical change. Socio-technical change with and without pay system | Productivity Escape behaviors | No change No change |
| Cordery et al. (1991) | Quasi-experiment – “greenfield” versus “brownfield” site of same company. No changes at brownfield site | Work attitudes Absenteeism Employee turnover | Better ^c Worse ^d Worse ^d |
| Macy and Izumi (1993) | Meta-analysis of previous empirical studies of organizational change and design – semi-autonomous and autonomous work teams | Overall performance Financial performance Behaviors Attitudes | Improvement Improvement No change No change |

| | | | |
|-------------------------------|--|--|--|
| Macy and Izumi (1993) | Meta-analysis of 131 studies organizational change and design – holistic and integrated change/re- design (structural, human resources, and technological) | Overall performance Financial performance Behaviors Attitudes | Improvement Improvement Improvement Improvement |
| Cohen and Ledford (1994) | Quasi-experiment (service company) self- managing teams compared to traditional teams | Performance (survey measures) Job satisfaction Growth satisfaction Group satisfaction Organizational commitment Perceived positive change in group Employee ratings of performance (self) Supervisor ratings of performance Manager ratings of performance Job satisfaction Unit effectiveness | Better ^c Better ^c Better ^c Better ^c No change Better ^c Better ^c No change Better ^c Better Better in functional units |
| Uhl-Bien and Graen (1998) | Comparative analysis of professional's use of individual self-managing activities in functional and cross- functional teams | Team performance and team member satisfaction | Higher. Partially due to peer evaluations and rotated leadership (partially mediated by workload sharing, voice, cooperation) |
| Erez, Lepine, and Elms (2002) | Quasi-experiment of 38 self-managed undergraduate teams | Productivity | Higher in for SDWT |
| Fredendall and Emery (2003) | Comparison between garages using SDWTs compared to garages having traditional teams | | |

Table 1. (Continued)

| Author(s) | Study Description | Organizational Performance Criteria | Results |
|---------------------------------|--|--|--|
| Tata and Prasad (2004) | Assessment of SDWTs effectiveness under different organizational structure types | Effectiveness | Higher under low levels of centralization and/or formalization |
| Arnett, Macy, and Wilcox (2005) | Structural equation modeling of the macro and micro elements of buyer-supplier relationships utilized self-directed "business or enterprise teams" | Objective sales growth and dyadic data from both buyers and seller | Hypothesized model versus rival model explained over 32% variance in sales growth over 5-year period |

^aThese are percent of all studies reviewed reporting improvements.

^bThese are percent of studies using autonomous work groups reporting improvements.

^cIndicates that autonomous teams were better than other type.

^dIndicates that autonomous teams were worse than other types of team.

positive, no change, or negative effects on the full organizational system (Whittington, Pettigrew, Peck, Fenton, & Conyon, 1999).

Moreover, several authors point out the evidence regarding the financial, behavioral, and attitudinal outcomes in organizational change efforts as being scarce and often unreliable (Goes & Meyer, 1990; Kahn, 1974; Macy & Mirvis, 1982; Pettigrew, 1985; Zucker, 1987). While some progress has been made, Pettigrew et al. (2001) suggest that the literature remains underdeveloped on several fronts – namely, the contribution of economic, behavioral, and attitudinal data utilized in a longitudinal change program.

A second issue of concern is the implementation decision of HPWS in an actual work organization. Executives often consider that implementing such profound changes is a huge organizational *and* personal risk that can reveal itself useless or being a remedy worse than the wound itself. Inertia and inadequate decision-making processes within a currently successful and “tightly coupled” firm creates a negative anticipation about the uncertainties related to the organizational change effort such as the direct negative impact on performance (the *J*-curve effect or the *J*-effect), (see Katz & Kahn, 1978, p. 297), or the indirect and unpleasant consequences experienced by the members (i.e., coordination confusion, shift in intra-organizational power, routines, changes in customer relationships) (Greve, 1999; Hannan & Freeman, 1977; Katz & Kahn, 1978; Miller, 1992; Weick, 1979). However, as stated by Lawler and Worley (2006, p. 283) “In an increasingly complex world, organizations built on traditional assumptions of stability, equilibrium, alignment, and predictability will, more and more, be out of touch and ineffective.”

Third, the relevance of the organizational change and development field is questioned along with its processes, the pertinence of its results, and the practical implications of its findings. Nested within different organizational levels and a specific contextual environment, the synergetic effects of the different HPWS design features should be assessed by a comprehensive array of measurement concepts and indicators. The overall implementation procedure should unfold in a sequentially ordered way, and as well be subject to the use of a punctuated time frame long enough to provide a continuous feedback about critical events and their pacing. These are the essential characteristics of the organization’s transformational journey.

Responding to these calls by various authors, this quasi-experimental field study addresses some of the concerns by not only assessing the added-value that HPO/HPWS and SDWTs might add over time but also as they are being implemented and integrated, even if the organizational innovation, design, development, and change literatures often treat and measure each of

them independently. The challenge is to strengthen the work innovation and change fields by ascertaining the truth, whatever it may be.

Through scholarly methods and longitudinal evidence, we address the scarcity of scientific support regarding the real impact that the design of a HPWSs has on organizational performance, especially when the firm is an “exemplar” or “great” organization (Collins, 2001). The subsequent impact will be assessed throughout the whole organization and linked to financial, behavioral, and attitudinal outcomes.

To do so, this chapter reports on a quasi-experimental longitudinal field study in one large manufacturing site of a large multinational consumer products company (ABC Company) and their 20-year organizational transformation effort to implement HPWSs and SDWTs within their entire North American manufacturing division. HPWSs and SDWTs were formed throughout all ABC’s North America manufacturing operations including their largest manufacturing site (Site A). The ABC Company is and was very profitable and deemed very responsible to its community. However, it undertook the challenge to evolve from a traditional organizational structure leading a mature industry to HPWSs capable of competing and changing in new competitive rivalry markets. Moreover, after the 10-year US supply-chain effort to design built to change HPWSs, they subsequently began to design some parts of their demand chain and some staff units. Currently, ABC Company in North America has re-designed over 30 business units or staff functions.

Distinguishing the organizational content from the organization’s context (Armenakis & Bedeian, 1999) should better expose the mechanisms, interactions, and rhythm of the change content and process, along with their effects on performance. Therefore, we introduce our HPWS assessment model (shown in Fig. 1).

This open system theory (OST) (Katz & Kahn, 1978) assessment model consists of six contextual organizational input domains, (both internal and external),¹ 15 design features in the transformation or execution part, and three sets of organizational output or result indicators (financial performance, employee behaviors, and employee engagement). Consequently, this study focuses on the effects that state-of-the-art organizational transformation and change efforts have on an “exemplar” organization that was built and designed to change.

This 5-year field study at Site A of the ABC Company adopts a quasi-experimental design. Typically, a quasi-experimental design includes either two time periods (“before” and “after”) (Pettigrew et al., 2001) or three time periods (“before,” “during,” and “after”). We chose to use three major time

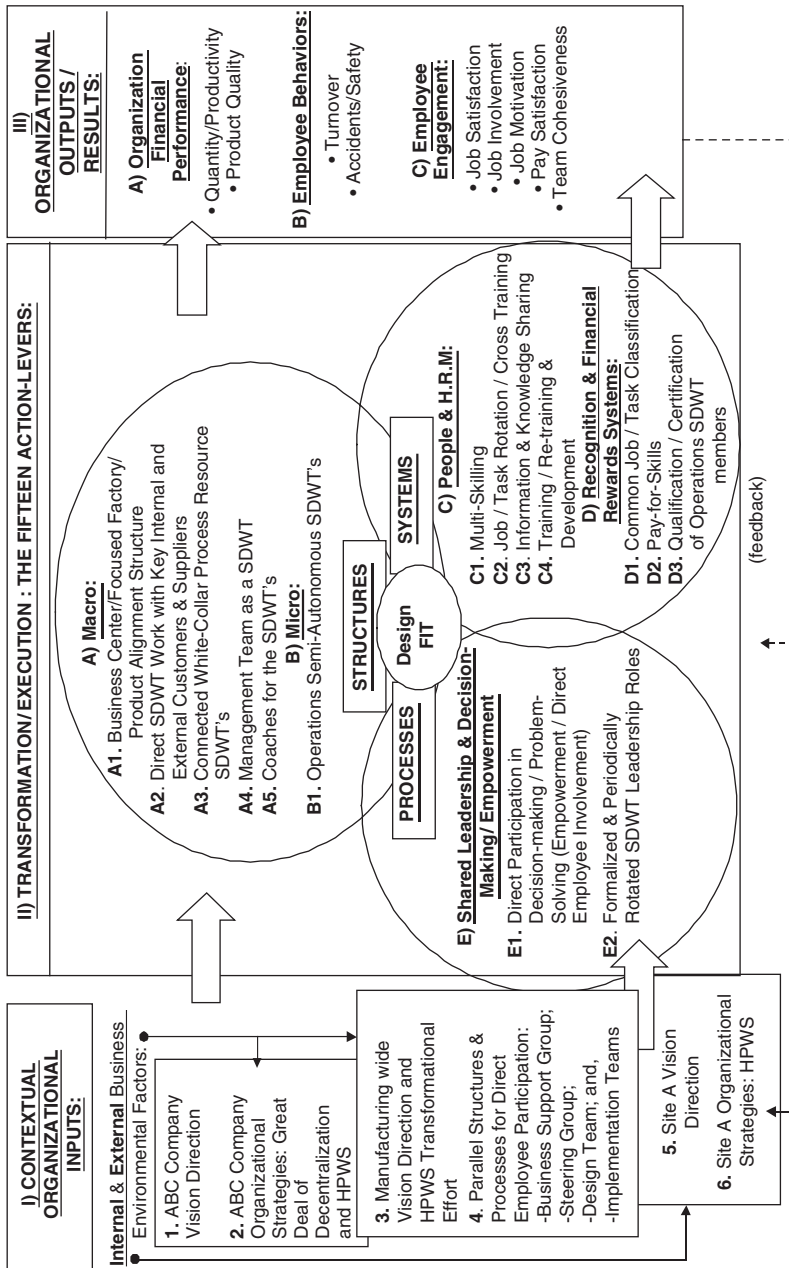


Fig. 1. The HPWS Assessment Model.

periods (baseline, during, and after) for the field study because the use of only two time periods would eliminate the ability to empirically examine the entire change process. Different types and levels of organizational performance outcomes were measured across these time periods, such as hard performance measures (e.g., productivity, product quality), behavioral (e.g., employee turnover and safety), and employee engagement (e.g., job satisfaction, employee motivation). All data (except for attitudinal) were collected over 54 consecutive months from *hard* company records. The data were then analyzed using a time series regression analysis. Rather than simply focusing on “before” and “after” results, the data were segmented into six 9-month time periods to provide a finer grained analysis of the entire change process. In fact, if the data was analyzed using just the “before” and “after” time periods, all results would be significant ($p < 0.01$). However, the ability to measure and explain the entire change process (before, during, after) would have been lost, thereby failing to meet one of the primary goals of the study.

LITERATURE REVIEW

To survive and perform, an organization must achieve the best fit and integration arrangements among its internal elements, themselves displaying an optimal congruence with the external elements of its specific business environment (Galbraith, 1995). Stemming from the socio-technical principles (Trist, 1981), the successful integration of the organization’s social and technical systems is achieved by the harmonious fit between the external environment and among its interdependent technologies, systems, structures, and processes (Pasmore, 1988). For example, a generic model of organizational design conceptualizes “a set of distinct but interrelated and bundled Human Resource Management (HRM) practices that together select, develop, retain, and motivate a workforce ... and produces superior firm performance. Employees are encouraged to apply their superior abilities, skills and behavior scripts in their work related activities so to provide the firm with superior results” (Way, 2002, p. 765). Therefore, these holistic HPWS design features integrate interrelated work systems, processes, and structures, and defines their degree of interaction. This design bundling enables the emergence of unique and complex organizational characteristics linked to its business context and can thus be considered a competitive advantage.

As suggested by Lawler (1982), each organization needs to make the appropriate set of design choices that specifically fit (see Katz & Kahn,

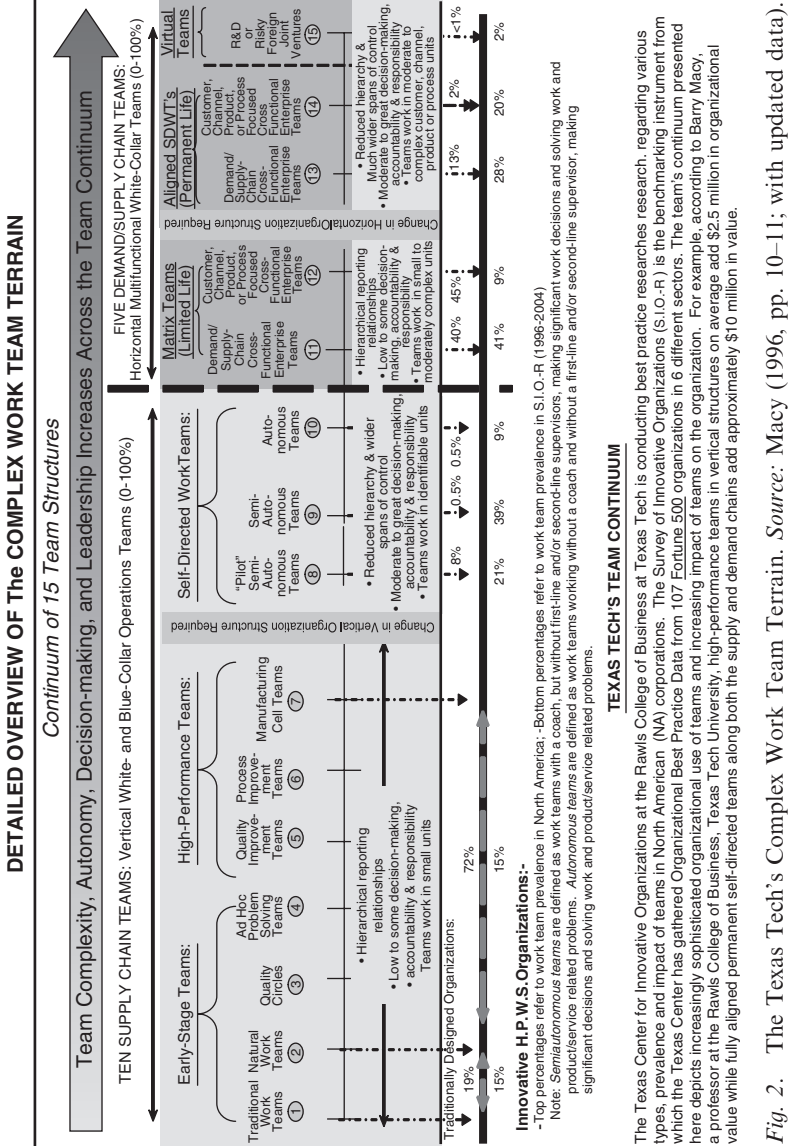
1978) the context in which the HPWS design is being implemented. These organizational choices arise from an extensive and sometimes overwhelming array of design features that will be carefully considered, assembled, and chiseled into interconnected HPWS structures, systems, and processes. These systems, structures, and processes include the 15 design features and others shown in Fig. 1. For example, a meta-analysis of work innovation and organizational change in 1,800 North American organizations from 1961 to 1991 (Macy & Izumi, 1993) identified and categorized 61 common design features or action-levers into four categories: structure (organization capacity), human resources, technologies, and TQM. However, over this 30-year period, only 14 “best practice” design features had significant positive impact on an organization’s performance. Again, this meta-analysis reinforces the notion of interdependence and bundling among HPWS structures, systems, and processes, and is reinforced by Armenakis and Bedeian (1999, p. 299) in the following: “a successful change effort may depend more on the congruency of fit between content, contextual, and process considerations than the nature of a change.”

The literature reviewed thus far has only alluded to the concept of “systems fit,” “interdependence,” or the need for “bundling” HPWS design features to improve organizational effectiveness (Galbraith, 1977; Katz & Kahn, 1978; Mohrman & Mohrman, 1997; Nadler & Tushman, 1988; Pil & Macduffie, 1996). Moreover, Huselid (1995), Lawler, Mohrman, and Ledford (1995), Macy and Izumi (1993), and Pil and Macduffie (1996) provide empirical support for this argument; however, prior research has mainly reported isolated individual HPWSs, while “conventional wisdom would predict that firms, SBUs [Strategic Business Units], and worksites adopting high performance work practices in one area are more likely to use them in other areas as well” (Huselid, 1995, p. 641).

The next section of this chapter discusses SDWTs, one of the main design features of the HPWS change effort at the ABC Company.

Semi-Autonomous SDWTs

According to the complex team terrain classification system (see Fig. 2) developed by Macy (1996, pp. 10–11), semi-autonomous SDWTs are but one of the 15 types or kinds of blue- and white-collar work teams operating in North America (10 different types of operations work teams, four different types of “demand and supply chain” work teams, and one “virtual” work team) found in benchmarking 105 innovative organizations in North America from



1991 to 2006. Approximately, one-third of these 105 innovative organizations were found to be “traditionally designed and profitable,” while two-thirds were “HPWSs and were very profitable” over the 15-year time period. Of the two-thirds of the organizations that were HPWSs, approximately one-half were “new design” and approximately one-half were “re-designed” businesses. Notice that along the operations section of the complex team terrain, there are 10 teams whose percentage (out of 100 percent) of successful implementation varies greatly from a traditionally designed organization to an innovative HPWS. Macy (1996) indicates that SDWT implementation dramatically increased from the 1970s to the early 1990s from about 1 percent of traditional organizations having successfully implemented SDWTs to the year 2006, where about 9 percent of the traditionally organized firms are successfully employing SDWTs (1 percent autonomous and 8 percent semi-autonomous SDWTs). However, during that same time period, more profitable HPWS organizations have successfully implemented SDWTs in their supply-chain operations much more than traditional organizations (69 percent versus 9 percent) [either pilot SDWTs (21 percent), semi-autonomous SDWTs (39 percent); or autonomous SDWTs (9 percent)]. In retrospect, truly autonomous SDWTs are still very rare in North American business, even after their initial introduction in the mid-1960s.

Data from the Survey of Innovative Organizations (S.I.O.-R, 1991–2005) indicate there are usually two types of SDWTs: (1) semi-autonomous SDWTs and (2) autonomous SDWTs. As indicated above, autonomous SDWTs are rare in “both” traditional organizations and innovative HPWSs. Design characteristics of these two types of self-directed or self-regulated work teams are listed below:

| Selected SDWT Design Characteristics | Semi-autonomous SDWTs | Autonomous SDWTs |
|--|---|---|
| 1. Shared leadership linked with different types of managerial core values, philosophies, and principles of management | Coaches are present for a period of time (maybe always) – usually for at least 12–18 months | No coaches present; teams report directly to higher management (possibly to business center leader or director) – very rare (only 9 percent of NA firms: 1 percent traditional firms, while innovative HPWS have 8 percent) |

Continued

| Selected SDWT Design Characteristics | Semi-autonomous SDWTs | Autonomous SDWTs |
|--|---|--|
| 2. Degree of multi-skill exhibited by the SDWT members | Some degree of multi-skill in the team typically 5–7 different tasks performed by SDWT members (operations, maintenance, quality, etc.) | Great deal of multi-skill in the team (typically 8–10 different tasks performed by team members)(usually takes about 9–10 years) |
| 3. Number of rotated and formalized leadership roles performed by SDWT members | Some, usually 5–7 different formalized and rotated leadership roles performed by SDWT members | Many (10–14) different formalized and rotated leadership roles performed by SDWT members (usually takes 7–10 years to be an autonomous SDWT) |

Source: Taken from the Texas Center’s Survey of Innovative Organizations (S.I.O.-R, 1991–2006). See Macy (forthcoming, 2008).

Implementing SDWTs requires knowledgeable (about the entire business value chain – both the supply and the demand chains) team members and effective coaches or team leaders (in the case of semi-autonomous SDWTs) (Wageman, 1997) to fulfill formal, rotated, and shared leadership roles different from those traditionally performed by supervisors and members of traditional work teams. Because SDWTs are so central to the holistic and integrated HPWS strategy, prior research on this aspect of the design is reported in this section of the study.

These “traditionally designed” organizations included in the complex team terrain have not changed their hierarchical reporting relationships with or without work teams implementation. In addition, they have not changed the decision-making, accountability/responsibility relationships between workers and management. Lastly, technology and/or their physical work space typically define a small work team.

In contrast, “innovative HPWS” have drastically changed their hierarchical structures and work relationships to have wider spans of control and a

flat/lean structure when they implement SDWTs. In addition, decision-making and accountability/responsibility relationships also have changed to accommodate SDWTs. All of these 10 types of work teams on the supply side of the value chain (operations) have both hourly and professional white-collar staff members.

On the right-hand side of Macy's complex team terrain (to the right of the bold vertical dotted line in Fig. 2) is the lateral or horizontal (Galbraith, 2005; Macy, Arnett, & Wilcox, 2003; Arnett et al., 2005) multifunctional white-collar work teams across both the "supply side" (non-operations) and the "demand side" of the firm's value chain. Once again, "traditionally designed businesses" display "limited life" (depending on the project or problem the team faces) cross-functional work teams that report on a matrix basis (reporting to two or more bosses). These traditional supply and/or demand cross-functional work teams have not changed their structures, decision-making, or accountability/responsibility relationships. In this situation, the work teams work in small to moderately complex work teams. These traditionally designed work teams are once again matrixed and have limited life. Eighty-five percent of traditionally designed work team organizations fall into this category.

In contrast, "innovative HPWSs" have 50 percent of their work teams designed like traditional organizations along their supply and demand chains. The real distinguishable difference in HPWSs is their 48 percent implementation of permanently aligned customer, channel, product, or process professional white-collar semi-autonomous SDWTs. For example, Procter and Gamble have over 100 customer business development teams or "customer enterprise teams" (teams ranging from 12 to over 200 members with sales revenue that ranges from \$27 million to over \$3 billion) totally dedicated and aligned to one or more large customers. Innovative HPWSs, operating along both the supply side and the demand side of their value chain, have reduced their hierarchical structure, have wider spans of control, have moderate to great decision-making authority, have changed their accountability/responsibility system and their work systems and processes in moderate to very complex working relationships with customer, supplier, distribution channel, product, and process (R&D, marketing, etc.) and have designed horizontal or lateral teams within and across the business. Chart 1 (see next page) depicts these "traditional" versus "HPWS" organizational teams along both the supply and demand chains of the total value chain.

In summary, implementation of linked and connected blue- and white-collar operations SDWTs and aligned cross-functional white-collar value chain SDWTs requires the organization to change its organizational

Chart 1. Traditional versus HPWS Organizational Teams (*Both sides of the Value Chain have 100% Represented).

| Supply Chain/Operations Work Teams* | Traditional Organizations (White- and Blue-Collar Teams) (%)* | Innovative HPWS (White- and Blue-Collar Teams) (%)* |
|--|---|---|
| Traditional work teams; natural work teams; quality circles; ad hoc problem-solving teams | 19 | 15 |
| Quality improvement teams; process improvement teams; manufacturing cell teams; high performance teams | 72 | 15 |
| *Pilot** semi-autonomous teams; semi-autonomous teams; autonomous teams | 9 | 70 |
| Horizontal/Lateral Multifunctional Supply and Demand Value Chain Work Teams | Traditional Organizations with White-Collar Work Teams (%)* | Innovative HPWS with White-Collar Teams (%)* |
| <i>Matrix work teams (limited life)</i> Demand/supply chain; cross-functional enterprise teams | 40 | 41 |
| <i>Matrix work teams (limited life)</i> Customer, channel, product, or process-focused cross-functional enterprise teams | 45 | 9 |
| <i>Aligned SDWTs (permanent life)</i> Demand/supply chain cross-functional semi-autonomous enterprise teams | 13 | 28 |
| <i>Aligned SDWTs (permanent life)</i> Customer, channel, product, or process-focused cross-functional semi-autonomous enterprise teams | 2 | 20 |
| <i>Virtual work teams</i> R&D and/or foreign ventures teams | < 1 | 2 |

structure and to shift authority for several types of decision-making and accountability/responsibility relationships to white-and-blue collar SDWTs. Moreover, it requires the organizational structure to change its systems and processes to support this new structure. First and second levels of supervision become redundant and the organization structure is flattened. Thus, SDWTs represent a paradigm shift in ways to organize work (Trist, 1981).

While still relatively rare in the research literatures, studies have shown that SDWTs (in supply chain and demand chain settings plus operations) are being adopted more often (Arnett et al., 2005; Macy et al., 2003; Macy & Moore, 2004; Cotton, 1993; Goodman & Associates, 1986; Fisher, 1993; Lawler, Mohrman, & Ledford, 1992, 1995, 1998; Wageman, 1995). In addition, the organization's critical support systems and processes (performance appraisal, reward and recognition systems, etc.) need to be changed. These key support systems and processes seem to be the "Achilles heel" of successfully implementing SDWTs on either the supply or the demand side of the value chain. Some of these support systems and processes plus other SDWTs design characteristics are depicted in Appendix A. Especially relevant in this data are the following SDWT design elements: average span of control for a SDWT coach or team leader 1:34; 54 percent of the sample used innovative pay systems with SDWTs; average number of meetings a year for a SDWT = 127 (4,898 minutes per year); and the SDWT design resulted from an organizational re-design (59 percent) rather than team evolution (16 percent). Other SDWT design features are referenced in Appendix A.

Furthermore, SDWTs seem to be associated with improved financial, behavioral, and attitudinal outcomes. However, some previous studies have found "no change" or hardly any financial improvements. Macy, Izumi, Hurts, Norton, and Smith (1986) found that self-regulating work teams have a general positive impact on financial performance but more specific, selective, and mixed effects on attitudes (also seen in Macy & Izumi, 1993). While the effectiveness of participative management has been debated (e.g., Locke & Schweiger, 1979; Wagner, 1994), some authors argue that direct (versus indirect) participation is effective when true decision-making power and authority shifts (Cotton, 1995; Macy, Peterson, & Norton, 1989) and not when participation involves mere suggestion or consultation without the corresponding decision-making power. Macy and Izumi (1993), in their meta-analysis studies of 1,800 firms from 1961 to 1991, report that autonomous and semi-autonomous SDWTs are associated with significant improvements in financial performance, but not employee behaviors such as turnover and accidents nor employee engagement.

The results of an extensive 50-year review of the empirical literature on SDWTs are summarized in Table 1. The first striking feature of Table 1 (see pages 345–348) is that there were only 19 scientific and empirical field studies over 50 years (1951–2005) investigating the effectiveness of SDWTs. In addition, the results or the impact of the use of SDWTs are in the positive direction, but not unequivocal! Some studies indicate the lack of positive results by reporting no significant change – a positive event given the “*J*-effect” or the “*J*-curve” literature (Katz & Kahn, 1978, p. 297). Only a few empirical research studies in Table 1 found negative results from implementing SDWTs.

In general, however, the SDWT inspired literatures and meta-analyses indicate positive and significant financial and behavioral performance results and to some degree selective positive results in employees engagement from SDWTs (e.g., Beekun, 1989; Cummings, Molloy, & Glen, 1977; Goodman, Devadas, & Hughson, 1988; Guzzo & Shea, 1992; Hackman, 1986; Macy & Izumi, 1993; Pasmore, 1988). While many studies have not made much reference to the overall organization design and system fit, many authors (e.g., Cohen, Ledford, & Spreitzer, 1996; Galbraith, 1994; Huselid, 1995; Lawler & Worley, 2006; Macy & Izumi, 1993; Pfeffer, 1998; Pfeffer & Veiga, 1999; Pil & Macduffie, 1996) report that an integrated and bundled design approach to HPWS design and the creation of the appropriate context are associated with improved organizational effectiveness.

THE FIELD STUDY: THE ABC COMPANY AND SITE A

Our 5-year HPWS field study at one large manufacturing site of the ABC Company aims for a better general understanding of HPWSs by integrating issues and concerns raised in the fields of organizational design, development, transformation, innovation, and change management. The 5-year change process is punctuated by six assessment time frames measuring the impact of the change effort on different performance outcomes. The sequence of events that describes how and when critical design features change attempts to link context with action taken and people involved, while concomitantly considering the effects of the change process and mechanisms through the use of temporal analysis. The empirical assessment of the real impact that these implementations have is conducted in different units of analysis on their respective levels of performance outcomes.

The following section describes the contextual setting and background, such as the three hierarchical units involved within the ABC Company,

prior to the transformation effort at Site A, the location of our study. This part represented by the “contextual organizational inputs” (see Fig. 1, p. 351), is essential to understand the “transformation part” at Site A, which will detail the specific set of 15 bundled and integrative design features that was implemented during the 54 months of our study. Furthermore, this section attempts to sequentially explore the actions taken within the organizational design to expose their relevant context in order to highlight the interaction and “fit” within and between the 15 design features.

ABC Units Involved

There are three main organizational units and levels involved in the ABC Company’s HPWS organizational design and change processes:

Corporate Level: The ABC Company

ABC Company manufactures and distributes several hundred consumer and industrial products all over the globe and has been in operation for more than a century. This high performing and paternalistic firm with a very long history of good employee relations at all levels has consistently been ranked in the “Top 100” of the preferred firms to work for since the early 1990s in the United States by *Fortune* magazine. A long history of profit sharing with employees and other such benchmarking practices has served to develop a strong sense of loyalty between the company and its employees. The highly sustained level of ABC’s historical organizational performance results, such as product quality (98 percent or better); employee turnover (less than 2 percent); and employee satisfaction (85th percentile or better), would qualify the ABC Company as being an “exemplar” or a “great” organization according to Collins (2001). At the beginning of the study, ABC’s sales revenue had increased 12 percent from the previous year to reach approximately \$4 billion. Approximately, 3,000 (75 percent of total United States workforce) employees were employed within ABC’s manufacturing division, the support staff, and the corporate headquarters.

Division Level: ABC’s Manufacturing Division

About 1,000 employees are employed in the ABC manufacturing division, which has 10 separate autonomous businesses located under one roof at one large, complex worksite. The manufacturing division level is the intermediary level between the corporate level and the Site A located on the ABC’s central manufacturing site. Because of the successful HPWS transformation

effort in manufacturing, the company later took on other businesses that needed to be designed. Subsequent to the HPWS manufacturing design, the company re-designed their total supply chain. Later too, they re-designed some parts of their demand chain organization.

Site A

The focus of our field study, one of the ten businesses at this central manufacturing worksite, is the largest of ABC's manufacturing plants. On average, about 240 employees have worked there for the last 15 years. Both white-collar connected process resource SDWTs and blue-collar operations SDWTs coupled with 13 other HPWS design features were implemented and assessed in this multi-business worksite.

Change Processes

A Continuous Change Process

From the ABC corporate level to the Site A manufacturing worksite level, the change process occurred in an "ongoing, evolving, and cumulative" effort defined under the notion of "continuous change" (Weick & Quinn, 1999, p. 375). This notion stems from the idea that "small continuous adjustments, created simultaneously across business units, can cumulate and create substantial change ... as interdependencies that are tightly coupled." This "changing" process is orderly sequenced to reflect the sequences of the change intervention and their consequences on the next steps (Armenakis & Bedeian, 1999; Pettigrew et al., 2001). Overall, the researchers account for six different time sequences, which could be assimilated in three major parts corresponding to "unfreeze, transition, refreeze" sequence (Argyris, 1990; Weick & Quinn, 1999).

A Longitudinal Coupling along Site A's Assessment Process

Site A's 54-month assessment process was divided in six equal time frames of 9 months each. These measurement periods along the course of action assess the evolution of organizational performance (at month 0, 9, 18, 27, 36, 45, 54). These six assessment time frames are described in Fig. 3 (see p. 363).

The organizational design and change process, as well as its implementation, unfolded over the course of 54 months and was theoretically based on two complementary organizational change perspectives: (1) values-based management (Collins, 2001; Collins & Porras, 1994); and, (2) direct

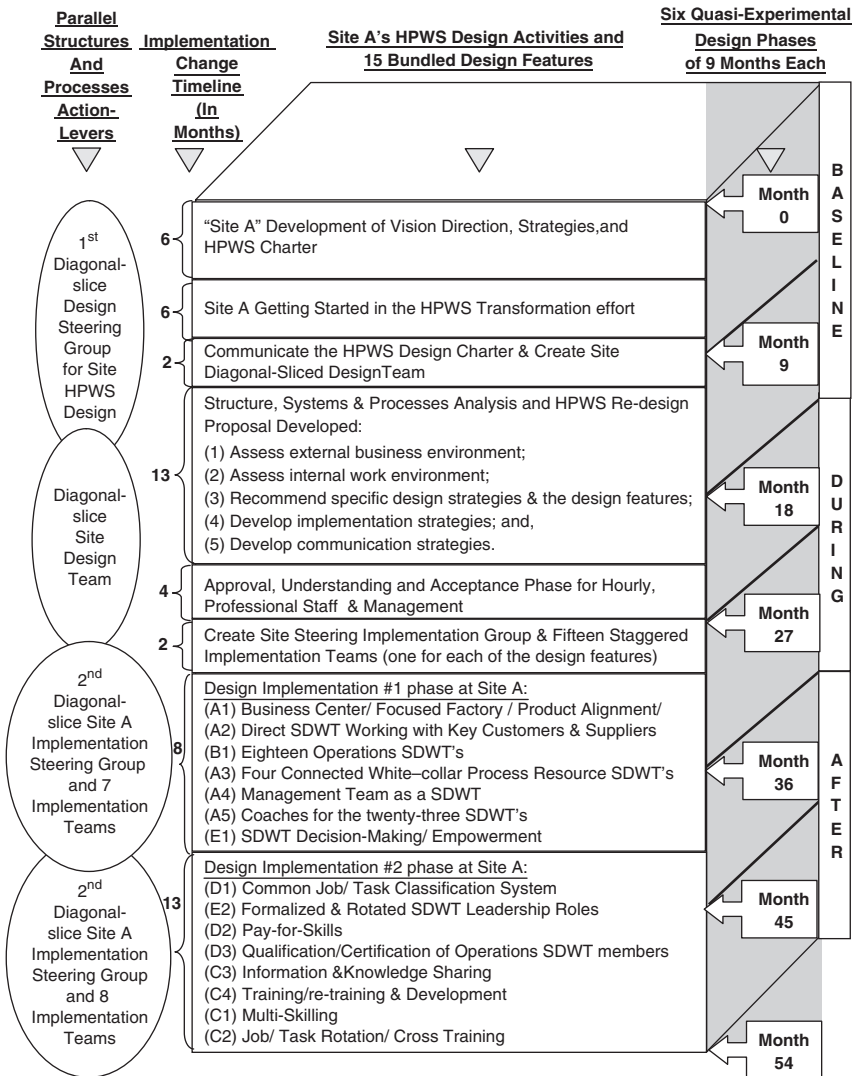


Fig. 3. Continuous Time Line for Site A of ABC Company Data Analysis and Company Planning, Design and Implementaion of the HPWS Design: Six Time Frames Over 54 Months.

participation (Cotton, 1993; Lawler, 1996; Lawler & Worley, 2006; Macy et al., 1989; Nadler & Gerstein, 1992; Trist, 1981; Trist & Bamforth, 1951). Consequently, the firm's core values, philosophies, and principles, especially regarding employee autonomy, employee participation, and business autonomy, were critical in the creation and communication of the site's business vision direction. Therefore, the HPWS design paid particular attention to the "design fit" (see Fig. 1) between structures, processes, and systems. It also took into consideration the additional core values, philosophies, and principles of the site and relied on direct employee participation throughout the change process. Following the company's, the manufacturing division's, and Site A's vision direction setting process, the Site A design team assessed the external business environment and internal work environment of Site A. Following these analyses, specific design strategies and action-levers or design features were recommended by the Site A design team. Finally, implementation and communication strategies were developed and approved by the Site A steering groups. In accordance with current views of employee participation and organizational improvement, four months were devoted to foster acceptance of the HPWS design and its complex implementation strategies by employees and management of Site A. Hourly employees, professional staff, and management were not merely assumed to want to participate, but were trained and coached in various participative behaviors.

Two phases of the specific design implementation were developed with the goal to create and ultimately work directly with key customers and suppliers. Prior to actual implementation of these SDWTs, a business center structure was designed and implemented. Then, connected white-collar process SDWTs were designed and implemented by the coaches (these coaches were composed of former supervisors, staff managers, professional staff, and hourly employees). After the connected resource teams were implemented, the operations SDWTs were implemented. This first phase of the implementation took eight months after the decision-making/empowerment training was completed.

The second phase of the design implementation took thirteen months (see Fig. 3) and began with formalizing and rotating SDWT leadership roles. A pay-for-skills system for hourly employees was implemented (mandated from ABC's top management) and accompanied by a qualification/certification system, which was determined by hourly employees selected by their peers based on their skill level, business information knowledge, and their training/re-training and development skills. Employee multi-skilling was developed with the required job/task rotation and cross-training. After many

months, this preparation stage finally resulted in SDWTs that were capable of working directly with the business center's key customers and suppliers.

*Contextual Organizational Inputs: The Internal and External Business
Environmental Factors*

To understand and comprehend the ABC Company's 20-year transformational change journey, the study exposes the following itinerary and its particular contextual map. This contextual background is composed by a series of design events prior to the Site A change effort. ABC Company's transformation effort (from a very good "traditional" organization to an "exemplar" organization (Collins, 2001) was first initiated fifteen years before the HPWS design strategy was implemented at Site A, which corresponds to the start of the field study. In addition, the ABC manufacturing division began the initial HPWS re-design in their first businesses at the worksite, five years before the design effort began at Site A. The first author of this chapter was also involved in this initial change effort.

Site A was the last of the ten worksites at the central manufacturing division to be re-designed and it was believed that it would be the most difficult. The sheer number of products, the toxicity of the raw materials used in the manufacturing process, the highest employee seniority level of any of the ten businesses at the central manufacturing site, and the largest number of employees all forced Site A to be the last business to be designed. Furthermore, any employee who did not want to remain in his/her business at the central manufacturing complex after their business had been designed, could "opt out" and transfer to any of the other nine businesses at the centralized manufacturing division. At the end of the HPWS manufacturing effort, employees could either voluntarily quit working at the ABC Company (hardly any did) or accept being transferred to Site A. Consequently, many employees who had opted out of the previous nine HPWS designs over the previous five year period eventually transferred to Site A (this site being the last HPWS re-design). In essence, many of the older and more vocal employees at the other nine businesses at the centralized site became members of the Site A workforce.

Grounded on decades-old foundations, the ABC Company was designed and managed utilizing the same traditional, paternalistic, and centralized way it had inherited from its strong manufacturing past of the mid-20th century. One exception was the commitment and loyalty that this privately

owned firm showed to its employees, asserting that “the goodwill of its employees is the only enduring thing the company can count on!” (internal ABC Company public document). A well-defined set of bureaucratic rules and regulations had created, over time, a fairly tall, multi-tiered, traditional management hierarchical structure, in which employee growth and development (for hourly and professional staff employees) typically took place by seniority. The ABC Company embodied the image of a paternalistic company with a tradition of lifetime, local employment driven by a centralized and “Tayloristic” view of its manufacturing activities. ABC’s niche-positioning strategy in different consumer product markets remains a prime factor to explain its steady growth during the previous decades, leading to a dominant position in market share against a scattered group of small and large, specialized and often regional competitors. Being an older high performing and very successful organization, ABC may have been more likely to undergo changes in their product-market strategy. On the contrary, ABC was more likely to experience inertia (Greve, 1999; Miller, 1992) in the organizational evolution process due to its paternalistic philosophies and 100 years of successful performance.

ABC Company Vision Direction

Most of the past and current literatures on the design of HPWSs have discussed the need to first develop a “vision direction” (e.g., Beckhard & Harris, 1987; Bliss, 1992; Collins, 2001; Collins & Porras, 1994, 1996; Lawler & Worley, 2006; Macy & Izumi, 1993; Macy, forthcoming, 2008). Vaill (1982, p. 29) defined purposing of high-performance systems as “that continuous stream of actions by an organization’s formal leadership that has the effect of inducing clarity, consensus, and commitment regarding the organization’s basic purposes.” A “future state” vision direction provides an enduring statement of the organization’s core values, philosophies, principles, and employee expectations that organization designers may return to for clarification, decision-making, and design parameters (Bliss, 1992; Collins, 2001; Collins & Porras, 1994, 1996). The sustainability of any organizational change mandates the importance of consistency between an organization’s current identity or envisioned image and the envisioned transformations (Fox-Wolfgramm, Boal, & Hunt, 1998). Consistency was demonstrated when ABC, fifteen years previous to the start of our field study, held a “3-month long meeting” with more than 200 hand-selected management, professional staff, support staff, and hourly employees from all over the globe reflected on “What the Company needs to do to compete in the 21st century?”

This intense and critical visioning process resulted in an “ever-green” company-wide vision direction document that was built to change and re-affirmed ABC’s core values, philosophies, and principles such as the commitment to its employees, already asserted by a long history of profit sharing with employees and other such innovative practices that had helped develop a strong sense of loyalty between the company and its employees. The ABC Company decided that to stay very profitable, they needed to proactively transform their organization and all its resources to have a competitive advantage through improved capabilities over their core competition. They needed to build the organization to change!

However, entering new markets also signified facing an intense rivalry from more experienced and larger consumer products firms. In addition, ABC went head to head with the giants of the consumer products business around the world. To stay as a high performer in this aggressive competitive landscape, ABC’s top management team decided that the only way was to match the competitors’ production capacity while developing flexibility and innovative organizational and team capabilities. The kind of transformational changes envisioned with the HPWS design effort would represent a major paradigm shift in ABC’s philosophy going from paternalistic (Block, 1994) with traditional management practices to the self-regulating power-sharing philosophy of an HPWS built on the principle of “always changing – always evolving”. One of the main ingredients of the ABC “future state” visioning process was the principle that all employees (management included) must perceive change as a “never-ending on-going process.” In other words, “A journey – not a destination!”

ABC Company Organizational Strategies

Organizational strategies are usually developed in the context of both the internal and external business environments while specifying the goals and objectives that the organization plans to achieve within the framework of the vision direction that has previously been defined. The strategies also specify how these goals and objectives may be achieved (Macy, Thompson, & Farias, 1995). One key choice, to be made at this point by the organization’s leaders, is the selection of organization design features and the degree of centralization or decentralization.

Five organizational design strategies were chosen by ABC’s management: (1) a substantial business decentralization (a great deal of decentralization with some centralization) of ABC’s current organization structure; (2) the formation of global and autonomous strategic business units (SBUs) (Hoskisson, 1987; Lawler, Mohrman, & Ledford, 1992, 1995; Macy &

Izumi, 1993); (3) autonomous business centers reporting structures (i.e., profit/loss business center and not a cost center) to ensure that integration, coordination, and communication and business autonomy would be implemented and coupled with decentralized staff support; (4) employees would be empowered and directly involved in the decisions made in the HPWS transformation change effort via parallel power sharing structures for decision-making (Cotton, 1993; Lawler et al., 1995; Macy & Izumi, 1993; Macy, 1982; Macy et al., 1989); and, (5) SDWTs composed of white- and blue-collar employees would be formed (Goodman et al., 1988; Kirkman & Rosen, 1997; Trist & Bamforth, 1951; Trist, Susman, & Brown, 1977). These five design strategies resulted in 15 specific design features that needed to be “bundled” together to fit an integrative and holistic HPWS design framework (see Fig. 1).

This business center concept, sometimes called a “focused factory” or “product alignment” in a manufacturing setting, typically results in a significant reduction in the number of management layers in an organization (Macy et al., 1989) and is significantly associated with improved financial performance when implemented with other hierarchical changes (Macy & Izumi, 1993). Lawler and Worley (2006) indicate that the business center structure provides all business center employees with real-time external supplier and customer focus. In essence, each of the 10 business centers (approximately 1,000 employees) in ABC’s manufacturing division was to be both externally and internally work focused.

These five holistic and bundled design strategies resulted in changes in both the ABC parent company structure and in their manufacturing division’s organization structure. Furthermore, the number of ABC Company/Site A management layers was planned to be reduced from six to three (VP of manufacturing, business leader of Site A, and autonomous SDWTs as a consequence of the business center design). Fig. 4 depicts the three (baseline, during, and after) planned stages of hierarchical layers reduction over time within Site A. At baseline, Site A started the HPWS design effort with six hierarchical decision-making layers. To achieve their layer-reduction goal of the three decision-making layers, a transition stage or “design implementation #1 phase” of five decision-making layers was needed. However, after the “design implementation #2 phase” was reached, four decision layers were deemed necessary from the vice president of manufacturing for the ABC Company to the semi-autonomous SDWTs at Site A. Over the two years of design implementation, the site was never able to eliminate the coaches’ roles. Therefore, they were never able to obtain the planned state of autonomous SDWTs. This is like many other change efforts in other organizations.

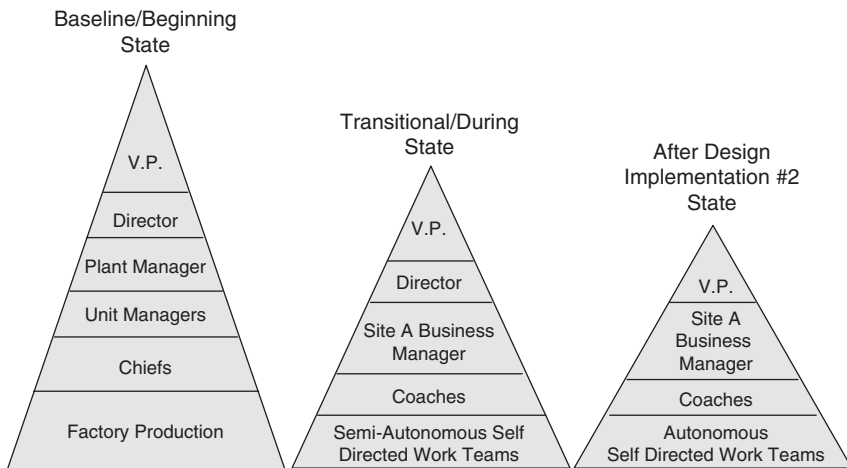


Fig. 4. ABC Company/Site A Hierarchical Decision-Making Layers Reduction: Planned 5-Year Time Period.

Both the design literature and change management theory indicate it is possible to reach the stage of autonomous SDWTs; however, Site A’s operational and organizational complexity linked with the human risks associated with self-management often prevent it. From our previous experience with designing SDWTs, there are some business and worksites (low complexity and low risk), where autonomous SDWTs can be implemented. By the same token, there are other businesses and worksites (high complexity and high risk – e.g., oil extraction from the frozen tundra in northern Canada) where only semi-autonomous SDWTs made good business sense!

The job titles, roles, accountability, and responsibilities of the heads of the businesses within the entire manufacturing division were changed at the corporate level, the central manufacturing level, and at the worksite level (consisting of 10 separate businesses including Site A). There was a major reduction in the number of central manufacturing and business middle-level managers, from 141 to 38 (without any layoffs), and a 28 percent reduction in support staff (also without any layoffs). These actions resulted in 38 percent reduction of manufacturing overhead costs for the ABC Company.

The first step toward a re-distribution of power and control through employee empowerment was the reconfiguration and decentralization of the quality control function, which was the responsibility of a centralized quality control department. This centralized product quality and incoming raw

material responsibility was shifted to the manufacturing line employees and resulted in a reduction in the size of the central quality control department from 37 to 6 employees (once again – no layoffs). Layoffs at the ABC Company were prevented by natural attrition, reassignment, and early retirement fostered by incentive packages. This reduction in workforce did not significantly affect, (neither positively nor negatively), the remaining employee attitude as measured by our periodic survey (see the “Results” section of this chapter).

However, this assertion cannot be made without some employee perspective qualifiers. Qualitative research interviews with about 25 employees and 5 coaches of Site A indicated that some employees felt that the HPWS design effort placed too many business and personal demands on them. These leadership demands were in terms of business complexity and self-regulating accountabilities and responsibilities. They were also expected to act “like leaders and not hourly employees”! Now, they had to assume new leadership responsibilities over and above the regular operation of the manufacturing lines and attend leadership meetings on shifts other than their own. From a design perspective, of course, this was one of the intended outcomes that ABC’s management wanted from the HPWS transformation effort. In addition, Site A was forced to receive all the other nine businesses’ employees who “opted-out” of their respective HPWS designs. Moreover, the new pay system was perceived, by some, to be unfair because relatively newer employees could potentially earn as much as an employee who had been with ABC Company for a long time. These types of employee complaints have been associated with other firm’s attempts to increase employee participation and are quite common in HPWS efforts (Pasmore & Fagans, 1992).

Other contextual changes in addition to the HPWS design were also implemented. As a first attempt to become more cost-efficient, ABC Company’s employee post-retirement health care package was modified to give older employees an incentive to retire early. The company previously paid 100 percent of the health care premium for the employee and spouse after retirement. Under the new health care plan, the company would pay only 50 percent for the employee and 25 percent for the spouse. In addition, ABC’s entrance in a new market became official when it purchased another company’s established product line about one year after the beginning of our study. This product line was originally manufactured by the previous company at three separate manufacturing plants employing approximately 1,750 employees. After the purchase was completed, the ABC Company closed the previous company’s three plants and subsequently transferred (via targeted selection) only 155 of the original firm’s workforce. Once

again, this indicates ABC's high-performance capabilities to change and adapt simultaneously.

ABC Manufacturing Division-Wide Vision Direction

About nine years after the ABC Company completed its revised global vision direction, the North American manufacturing division, of which Site A is an integrated part and its largest business in terms of sales volume, started their vision direction work under the "ever-green" umbrella of ABC Company's overall vision direction document. Enhancing and restructuring the manufacturing organizational capabilities to cut cost and become more effective while maintaining employee commitment and loyalty were the HPWS goals. Gaining the flexibility needed to bring to market new and innovative products more frequently (decrease turnaround), while at the same time protecting the current performance level from being impacted negatively by the upcoming HPWS transformation efforts, were also goals of the ABC Company and manufacturing division in initiating a HPWS strategy.

Direct Employee Decision-Making and Direct Employee Participation: Parallel Structures and Processes

Parallel change or employee decision-making power-sharing structures and processes (i.e., the direct participation and decision-making of management, staff, and hourly employees in the HPWS transformation effort) are a common design feature directly linked to improved organization performance (Macy et al., 1989; Macy & Izumi, 1993) and seems to be a key design feature for an organization to ensure long-term survival of the design (Bushe & Shani, 1990; Cotton, 1993; Macy, 1982; Macy & Izumi, 1993; Sherwood, 1988). These parallel and adjacent decision-making structures and processes are in "addition to" the traditional organizational structures of the organization and usually consist of cross-sectional, diagonal slices of employees representing all functions and hierarchical levels. These parallel employee decision-making forums (see left side of Fig. 3) allow for direct (versus indirect) participation in the HPWS design and are associated with higher levels of organizational performance and employee commitment as well as lower levels of employee resistance to change (Coch & French, 1948; French, Israel, & As, 1960; Macy et al., 1989; Macy & Izumi, 1993; Weisbord, 1989).

Site A created a site design steering group and a site design team for the HPWS design. Both of these teams were comprised of management, staff, and hourly employees. In addition, both of these teams were a "diagonal slice" of the Site A organization. More will be said about these teams later.

After the completion of the 14 months Site A design proposal phase, an "Implementation Steering Group" (this second leadership steering group had emphasis on the design implementation versus the initial design steering group, which had emphasis on the design proposal) was created in order to provide employee diagonal-slice decision-making throughout the two design implementation phases during the next 21 months at Site A.

This new diagonal-slice decision-making group had considerable membership overlap from the initial Site A design steering group and their "design team." In addition, this "direct participation" in the change effort by those employees affected by the HPWS design included a significant number of Site A's management, professional staff, and hourly employees. Over 30 percent (approximately 70 employees) of Site A's total workforce were directly involved and directly participating in the HPWS design and implementation efforts (via steering groups, design teams, or implementation teams).

The next section corresponds to the beginning of our field study as the transformational effort has trickled down from the corporate headquarters to be implemented, starting by the visioning process, at the Site A level.

The First 14 Months at Site A

Site A Vision Direction

To manage the process of HPWS design and the subsequent critical implementation efforts, an initial diagonal-slice steering group (from top to bottom within Site A) of operation employees, professional staff, and management representing all functions and hierarchical levels was created. This "cross-functional and diagonal-slice leadership steering group" (Macy, 1982; Macy et al., 1989; Sherwood, 1988) for the HPWS design was led by the director² of the manufacturing division and consisted of business center employees from all levels at the Site A workplace. The main role of the site steering group was: (1) to determine Site A's vision direction (5 years in the future – not an "end state" but a "future state" that always changes); and, (2) to charter (what's "in" and what's "out" for the design) the HPWS design at the worksite by specifying the organization's boundaries and to make the necessary resources available in order to guide and support the design and the subsequent implementation efforts. The resulting Site A "future state" vision direction consisted of additional site specific core values, principles, and philosophies for the worksite and listed specific objectives and key success factors (customer, business and people) that the business wished to achieve as a result of the HPWS transformational effort.

A cross-functional, diagonal-slice (different levels and functions) “site design team” (Macy, 1982; Macy et al., 1989; Pasmore, 1988) was then created and became responsible for: (1) assessing the external business environment; (2) assessing the internal work environment of the business; (3) recommending specific design features; (4) developing the HPWS implementation strategies; and, (5) developing communication strategies before, during, and after the HPWS design effort. This 12-member site design team was full-time and was led by a full-time Site A design project manager that coordinated the various analyses, assisted the design team in developing the design proposal, participated in developing the implementation plan, and coordinated the external consultants work with the steering group and the site design team. These full-time site design team members were selected by the site steering group after internal ABC Company advertisements were made and a design team selection process was developed. An important criterion that governed the selection process was the wide representation from all employee levels and functions at the Site A worksite. These site design team members were to be the “best employees” in the business – not the employees that could be made available without any pain for the business!

Site A Organizational Strategies

After the Site A vision direction had been determined by the site steering group, a present state analysis was undertaken by the site design team through a series of diagnostic efforts in four phases. The following analyses were performed: (1) an external ABC Company and Site A business analysis (Adler & Docherty, 1998; Macy et al., 1989) was conducted to take into consideration the competitive dynamics of the company environment; (2) a “technical analysis” to identify variances or bottlenecks and recommend solutions to improve (Pasmore, 1988); (3) a “social analysis” to identify people and human resources management (HRM) systems that were needed to change; and, (4) an “information and knowledge systems analysis” to determine the verbal, electronic, and paper information and knowledge requirements and needs from and to the external business, the various internal business centers, the SDWTs, and others at the multi-business worksite. To perform these four analyses, the site design team had to understand how their own business operates, the implications of the change effort for both external and internal customers and suppliers, the financial performance of their business, and the HRM systems (Pasmore, 1988). Subsequently, these four analyses enabled the site design team to identify major technical,

business, information and people-related issues and barriers to organizational performance within the ABC Company and Site A.

In addition, the design team and external consultants developed an employee attitude survey to assess social and organizational issues drawing mainly from the Michigan Organization Assessment Questionnaire (Camman, Fichman, Jenkins, & Klesh, 1983). Measures were developed to address other organizational issues unique to the worksite. Data from these four analyses were periodically fed back to employees at Site A during a series of informational small groups “fireside chats” (parallel informal communication systems between employees and their management) by the site design team and the site steering group.

These four social-technical systems (STS) analyses ensured that the HPWS design effort considered not only social and technical needs, but also the needs of the business and the costs of the product/service being produced. These analyses, in addition to the up-front organizational scan, took approximately 14 months to perform and resulted in the basic technical, business, information and knowledge, and social analyses for the Site A design proposal. Fourteen months (full time) for a design team to complete these five (four separate analyses and the design proposal) difficult and complex design tasks is indeed a very long time. The company, in hindsight, agreed that the business complexity and the risks involved were the main time constraints. Furthermore, the ABC Company continued to use full-time (rather than part time) design teams. All the other design teams at the manufacturing site were able to accomplish their design tasks in approximately 6–8 months -- some part-time and some full-time.

The Next 19 Months: The Design and Acceptance Phases

This organizational design phase included the diagnostic efforts described above, as well as creation of the actual HPWS design proposal by the site design team. This was followed by the “approval, acceptance and/or modification” phase (by the site steering group composed of management, professional staff, and hourly employees). During this time, the HPWS proposed design features were communicated face to face via “fireside chats” with all Site A’s employees and discussed with all functions and staffs at the multi-business worksite level.

Overall, 90 percent of the HPWS design proposal was specifically recommended to the site steering group (the other 10 percent of the design proposal was eliminated after discussions with the site steering group). With

little or no modifications, the Site A leadership steering group agreed upon and recommended to the manufacturing division that almost all the elements of the HPWS design proposal be implemented. However, some employee resistance (Coch & French, 1948; Cummings & Worley, 1997) to the change effort was to be expected and remained a difficult issue for the management and workforce to deal with, especially given the fact that there was “nowhere to opt out” anymore for employees who did not like the design.

This critical time period is when the design features and the sequencing of various parallel direct employee participation structures and processes in the HPWS design effort were very important. Also critical in the design process was the constant and ongoing communication with all employees in the organization about the HPWS design process to be followed to implement the transformational changes at Site A, to not only alter the perception of change, but also the involvement of those affected and the sequencing of the design features. These HPWS design features were mutually supportive of one another and emphasized the philosophies of fewer hierarchical layers (from the initial six hierarchical levels to the four subsequent levels of the business center), a large degree of decentralization with an autonomous business center, employee and organization autonomy, and employee empowerment. Site A’s practical operationalization of their HPWSs design features are found in the following 15 “key action-levers” section and was shown in Fig. 1.

The Final 21 Months: The Two Design Implementation Periods

The 15 Bundled and Integrated Action-Levers or Design Features: The Fit between Organization Structures, Systems, and Processes

The HPWS design and acceptance or modification phase incorporates the following 15 bundled and integrated design features or action-levers being part of the organization’s structures, systems, or processes (see Fig. 1). In the following section, we will provide a detailed description of the *five* macro and *one* micro organization structure design features (A1, A2, A3, A4, A5, and B1); the *four* people and HRM systems design features (C1, C2, C3, and C4); the *three* recognition and financial reward systems design features (D1, D2, and D3); and finally, the *two* shared leadership and decision-making/empowerment processes design features (E1 and E2).

This HPWS organizational design plan (with its integrated and bundled 15 action-levers) was separated by two equally important design

implementation phases – called “design implementation #1” and “design implementation #2.” At the same time, both the Site A design team and the initial steering group were disbanded. A second Site A “Implementation Steering Group” (with a great deal of overlap of employees from the previous two groups) was organized to implement the new HPWS organization design at Site A. In addition, 15 diagonal-sliced “implementation teams” (one for each design feature) were formed, each of them reporting directly reporting to the second Site A implementation steering group. All operation (blue collar) and connected process resource teams (white collar) SDWTs were simultaneously implemented over a period of 9 months (see Fig. 3).

The 15 integrated and bundled HPWS organization design features implemented at the ABC Company/Site A are classified and referenced by the numbers on the reduced assessment model shown in Fig. 1. These 15 HPWS design features or action-levers are viewed from a holistic, integrative, and “bundled” perspective as they must harmonize and fit with one another (Huselid, 1995; Kirkman & Rosen, 1997; Macy & Izumi, 1993; Trist, 1981; Wageman, 1995).

Macro Structure Action-Levers: Business Center/Focused Factory/Product Alignment Structure (A1). Skinner (1974) argued that a manufacturing unit that focuses on a narrow line of products or business mix, for a particular market niche, will outperform a conventional or traditional manufacturing plant. The structural implications of the business center concept involves an organization by product line or technologies to “bring into the business” the critical organizational functions, work and various tasks and activities that are key to their business processes. The business centers at the ABC Company mirrors a small focused factory usually with a single technology but with multiple products (Harmon & Peterson, 1990; Skinner, 1974) enabling a close proximity between organizational functions and work tasks. Recently, Arnett, Macy, and Wilcox (2005) found self-directed white-collar professional mini-business teams (mentioned earlier and called “customer enterprise teams”) to be positively related to increased sales volume. These customer mini-business teams were modified profit and loss centers operating very autonomously serving one to two large retail customers. These would be very similar to an autonomous business center operating with semi-autonomous, cross-functional SDWTs or Enterprise Teams in a sales organization.

The business center concept is to develop a balance between power and control and to gain from the synergy between the lower costs achieved by economies of scale and the gains sustained by a more effective service,

delivery, cycle turnaround time, quality, and value to both the internal and external customers. Lawler and Worley (2006, p. 305) indicate that business centers “allow people to see more of a whole business; employees are not physically or psychologically ‘far away’ from the organization’s capabilities or its work. The result is that there is much more focus on getting work done” (i.e., flow to the work).

One critical organizational design issue in the context of business centers is the determination of the reporting relationships of the product or business manager to higher management. There are usually two overall possible organizational structures in a business center design: (1) the implementation of a two solid-lines reporting relationships (one solid-line for product/business issues from the business manager to higher management and the other solid-line from the same site manager for personnel, safety, labor issues, etc.) or (2) one solid-line for business and one dotted-line for personnel, safety, and labor issues (Macy, forthcoming, 2008). This “solid-line” dual-reporting structure (two solid-lines rather than one solid and one dotted, the latter being the traditional matrix structure) of the business center is highly beneficial because of the direct linkage and understanding of the entire value chain (from back-end suppliers to front-end customers).

The business center design in Site A allowed all 240 employees a better information and knowledge sharing of their suppliers and customers (both internal and external). This two solid-lines dual reporting structure enables the business center to directly link and communicate with suppliers and customers. In addition, having two solid-lines (i.e., the business center manager reporting to the “business” team and to top management for human resources) have additional benefits, such as mutual goals, joint performance appraisals, power sharing between the two bosses, and alignment of goal and reward systems.

These two solid-line reporting relationships formed the business center structure at Site A. This kind of two solid-lines dual reporting organizational structure was critical to the success of ABC company’s decentralization strategy, in that it allowed Site A to exert autonomous power and control over its structures, people, systems, processes, and technologies. In addition, this autonomous business center design provided a “seamless” value chain.

The Site A business center structure, along with their four connected white-collar SDWTs process teams, and their 18 operations SDWTs is shown in Fig. 5. This figure indicates that there were 23 (*one* at the business-center level, *four* at the process level, and *eighteen* at the operations level) semi-autonomous SDWTs within the total business center structure at Site A. The

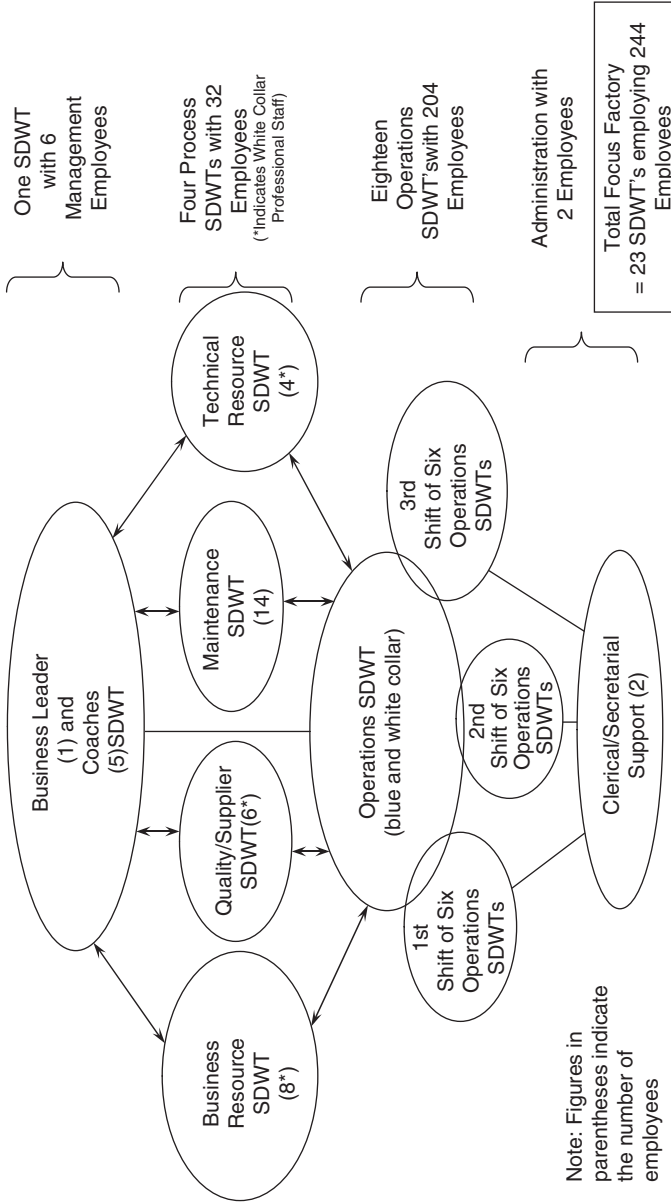


Fig. 5. ABC Company/Site A: Business Center/Focused Factory/Product Alignment Design – Management, Process and Operations SDWTs. Source: B. A. Macy, Successful Strategic Change, San Francisco, CA: Berrett-Koehler Publishers (forthcoming, 2008).

figures in parentheses within Fig. 5 represent the actual number of employees in each SDWT (the average number of employees per team was 11). At the process level, there were four SDWTs, with on average eight employees per team. The management SDWT had six members – the business center manager and five coaches. The coach for the management team (the team leader, the developer, and the mentor of the team) and the four process SDWTs was the Site A business manager. As Purser and Cabana (1998, p. 44) indicate “... that if they (the management) didn’t learn to coordinate work across functional boundaries, then how could the rest of the organization learn how to do it?”

The four white-collar connected process SDWTs were: (1) business resource team (planning, scheduling, training, IT/IS); (2) quality/supplier team (responsible for all incoming raw materials and finished goods quality); (3) the maintenance team (light to medium complexity for mechanical and electrical maintenance for Site A, while heavy or complex maintenance was handled by a centralized maintenance organization); and, (4) technical resource team (process engineering, technology, and physical layout and equipment/technology design for Site A). The maintenance teams were comprised of hourly employees, while the other three processes for SDWTs were composed of professional and degreed white-collar employees.

At the operations level, there were 18 SDWTs operating across the three shifts (six SDWTs per shift). There were five operating coaches responsible for these 18 operations SDWTs. In addition, there were two clerical and secretarial support staff for the 23 SDWTs at Site A.

Macro Structure Action-Levers: Direct SDWTs Working with Internal and External Customers and Suppliers (A2). Like six sigma, the decentralization of a centralized quality control function provides those directly responsible for making the product accountable and responsible for all incoming raw materials and outgoing finished goods from their business. Typically, the structural design change involves both “internal” as well as “external” customers. The TQM (Dean & Bowen, 1994; Lawler et al., 1992, 1995) practices require direct key customer and key supplier contacts, which were introduced at Site A to enable the exchange of key business information and feedback from the business to their key external partners. Some SDWTs directly processed their own customer complaints. Manz and Sims (1993) observe a link between SDWTs and improved product or process quality. At Site A, this HPWS design feature was implemented as part of the manufacturing division’s central-wide decentralization effort. Site A implemented

this design feature at design implementation #1 phase, along with the business center structure and other macro structural features (see Fig. 3).

Macro Structure Action-Levers: Connected White-Collar SDWT Process Resource Teams as Area Mini-Business Teams (A3). Already mentioned in the “organizational strategies” section above, connected professional white-collar SDWT process resource teams were an integrated part of the HPWS design. These totally dedicated, full-time, multi-functional, mini-business teams (Arnett et al., 2005) were composed of mainly degreed professional team members that were truly cross-functional in nature (Lam, Bischoff, Higgins, & Persing, 1999; Purser, Pasmore, & Tenkasi, 1992). They provided direct support and leadership to the operations-related shift SDWTs in the business center. Such connected process SDWTs provide certain expertise for the shift SDWTs (resources, technical maintenance, engineering, incoming raw material and finished goods, quality control, and business information and knowledge) to improve in the areas of product/service delivery, product/service quality, costs, production, technology, and safety. These connected resource professional SDWTs are typically directly linked to key customers and suppliers, the central manufacturing division, and the SBU. These cross-functional SDWTs addressed issues like line/layout modification and other issues beyond the skill levels of the operations SDWTs and provided business information, training, planning, and scheduling support. For example, a resource team would provide assistance to shift SDWTs to make engineering design changes to equipment used on a manufacturing line.

Macro Structure Action-Levers: The Management Team as a SDWT (A4). As was stated earlier by Purser and Cabana (1998), the management of Site A (the one business center leader and the five coaches or team leaders) must be able to operate as a SDWT if they are expected to coach and develop the rest of the organization to be self-managing. Over a period of about 12 months, the outside consultant and others above the business center manager developed and coached the five coaches and the business leader to be self-managing.

This was indeed a key design feature in the re-distribution of power and control at Site A. This coaching, development, and mentoring of the management team consisted of site visits outside and inside ABC Company where business centers and SDWTs had already been implemented, coupled with having a dialogue regarding the re-distribution of power and control within Site A (i.e., various decisions to be made by management versus the

SDWTs versus individual team members). In addition, the ABC management person above Site A's business leader (i.e., vice president of manufacturing) also coached Site A's business leader. He was very familiar with self-management. In his previous position with the ABC Company, he was the European VP for manufacturing and in charge of their European transformational effort involving SDWTs and business center designs.

These SDWTs were designed to empower employees closest to the business' key internal and external customers and suppliers in order to create an organizational capability that the business could leverage upon entering highly competitive markets. This HPWS organizational design feature was also consistent with the firm's core values, philosophies, and principles related to its employees and the firm's commitment to high performance. Finally, the employees (hourly employees, professional staff, and coaches who were members of these SDWTs) were trained and developed in accordance with participation theory. Pasmore and Fagans (1992) refer to this participation as "organizational citizenship."

Macro Structure Action-Levers: Coaches for Management, Operations and Process SDWTs (Rather than Supervisors) (A5). As part of the site's HPWS design, first- and second-line management layers were eliminated (without any layoffs). A new role of a "coach or team leader" for the SDWTs emerged to replace the old role of supervisor or manager. The new role of a SDWTs coach was introduced and new shared leadership roles among and between the coaches, and the SDWTs were incorporated into the new roles of the coach and team members. In addition, "formalized, rotated, and required" leadership roles were performed within each operations and some process SDWTs by team members. Within the HPWS design, SDWTs were empowered to make certain work-related decisions and solve problems as a self-managing team that would normally be the responsibility of supervisors in traditional organizations.

In the early stages of the SDWTs' maturity and development, former supervisors may perform the role of a "coach" or "coordinator" or "team leader" fulfilling the need of the semi-autonomous teams for training, guidance, and support as SDWT team members learn to work in a self-directed fashion. In typical HPWS designs with self-regulating teams, the coach of SDWTs performs four primary roles: (1) being an active team member; (2) observer and team monitor; (3) team facilitator; and, (4) being an active intervener or "the boss." To be successful and effective, coaches in organizations with SDWTs must be able to effectively wear these four "hats" and practice shared leadership and control with their SDWT. This process of

training, mentoring, and shared leadership is very difficult; this is a very different type of shared leadership role for former supervisors and managers to assume and many cannot make this transition (Perry, Pearch, & Sims, 1999; Wageman, 1997). In a benchmarking study of North American Organizations from 1991 to 2006, 105 organizations indicated that over 66 percent of former supervisors or managers cannot perform the new role of coach or team leader for an SDWT (Macy, forthcoming, 2008).

Micro Structure Action-Levers: Operations SDWTs (B1). Initially, Site A at the ABC Company had 18 operations semi-autonomous SDWTs that were designed with an up-front planned phasing from semi-autonomous to autonomous SDWTs to be designed later in the HPWS transformation effort.³ In addition, each semi-autonomous SDWT had responsibility for specific products and technologies. Operations SDWTs that spanned all three shifts (retained from the old structure) enabled the teams to address issues that affected each line and their technologies across the three shifts. Each operations and process SDWTs was authorized to spend up to \$50,000 (without any management approval) per year on improvements to their business. Moreover, each SDWT member could spend \$1,000 per year on his/her business needs without management's authorization.

In summary, the business center structure, the management team as a SDWT, the quality control functions decentralized and placed into the business center, the connected process resource SDWTs, and the operations SDWTs were simultaneously implemented over an 8-month period. At the end of this period, the ABC Company's upper management decided that the operations SDWTs (NOT the white-collar connected process SDWTs) were "never" going to be autonomous SDWTs. They would remain semi-autonomous SDWTs! Furthermore, coaches or team leaders would remain.

People and HRM Systems Action-Levers: Multi-Skilling (C1). Redundancy of task and skill is achieved through the development of multiple skills (Lawler et al., 1995; Morgan, 1997; Trist, 1981). Multi-skilling requires SDWT members to learn all the technical, team, and business skills that are needed within the SDWT to produce the desired outcomes. Macy and Izumi (1993) found multi-skilling to be positively and significantly associated with financial organizational performance improvement. A skills mastery system at Site A was designed so that hourly SDWT members could acquire and maintain proficiency in all defined tasks (not jobs). Eventually, they were able to perform seven (i.e., production, quality control, light to medium maintenance, scheduling, etc.) different types of operations tasks. It is

important to note that all SDWT members had specific *tasks* and *leadership roles* to perform. They did not have specific *jobs*! Their motto was: “Flow to the Work!” Consequently, this enabled the required employee job rotation to be successfully implemented.

People and HRM Systems Action-Levers: Job/Task Rotation and Cross-Training (C2). While multi-skilling enhances the skill levels of SDWT members, the “required” job/task rotation helped to maintain these technical, team, and business skill levels. This job/task rotation and cross-training provides opportunities for more task variety (Hackman & Oldham, 1980) and for an increased information and knowledge of the entire business and manufacturing processes. Macy and Izumi (1993) and Macy (forthcoming, 2008) found job/task rotation and cross-training to be positively associated with improved financial performance. As part of the HPWS design, hourly employees were required to periodically rotate “task areas” within their six shift-operating SDWTs. The process SDWTs did not require job/task rotation – although some minor job/task rotation and cross-training did take place, especially in the engineering and maintenance areas.

People and HRM Systems Action-Levers: Information and Knowledge Sharing (C3). Business information and knowledge sharing (Castrogiovanni & Macy, 1990; Daft & Lengel, 1986; Galbraith, 1977; Lawler et al., 1992; Mohrman & Cummings, 1989; Nadler & Tushman, 1988) within a particular SDWT and across SDWTs enables them to make appropriate decisions and solve business problems (Lawler et al., 1992). Attempts were made to provide and communicate as much of ABC and Site A business information as possible throughout all employees at Site A. Business information was shared at quarterly business meetings and at monthly SDWT “fireside chats.” In addition, each employee had access to a computer at work and many had company-provided computers at home. For example, every Site A employee had an e-mail account. Moreover, each SDWT had a ten minute meeting each day before their work began. Their design motto was, “You cannot over communicate!”

People and HRM Systems Action-Levers: Training/Re-Training and Development (C4). Skill development is important to fulfill the SDWT principle of redundancy of task and skill as well as to rotate tasks and leadership roles (Trist, 1981). Macy and Izumi (1993) found multi-skill training and re-training and team building/group problem-solving (but not general education and training) to be best practices and significantly related to

improved financial performance. A new full-time professional training manager was appointed and dedicated for Site A. In addition, the operations SDWT crew sizes were augmented each with one additional full-time training slot (18 total slots), enabling team members to be rotated through training and re-training on a regular basis. The average Site A training/re-training and development time per employee was 192 hours per employee per year during the 54-month period of study. Most of their training and re-training (approximately 75 percent) was for technical tasks (other operations tasks, maintenance, quality, etc.). In addition, softer-type training skills (like group dynamics, leadership, team training and business training) were part of the training/re-training and development plan. After the two design implementation periods, Site A's training/re-training numbers decreased to around 150 hours per year per employee. This is indeed a quite high number; however, the leadership, multi-tasking, and business requirements were also quite high for all employees. However, the results seemed to justify these high training, re-training, and development numbers.

Recognition and Financial Reward Systems Action-Levers: Common Job/Task Classification (D1). A common job/task classification system composed of many operational and technical tasks (not a "job") and leadership roles (not common pay) and removal of status differences is important for the effective rotation of technical skills, leadership development, and team decision-making to be implemented. Implementation of a common job/task classification system is coupled with Hackman and Oldham's (1980) concept of a broad rather than a narrow task description. Macy and Izumi (1993) found a common job/task classification system to be related to improved financial performance. All hourly employees at Site A were given the title of "Associate" (not same pay) regardless of their tasks and leadership roles. All connected SDWT process resource team members were given the title of "Resource Associates Staff Person." None of the SDWT members had specific jobs to perform; they had tasks and leadership roles to perform!

Recognition and Financial Reward Systems Action-Levers: Financial Reward Systems versus Pay-for-Skills (D2). The Site A design team proposed and received approval from their steering group for a pay-for-versatility (PFV) system. PFV is a financial reward system, where employees increase their pay on the basis of their technical skills, their team and business responsibilities, and performing their formal and rotated leadership roles. Therefore, PFV goes beyond the technical skills-based pay (SBP) (Jenkins, Gupta, & Ledford, 1992) system, where SDWT members are paid based on their

technical knowledge and skills. PFV rewards employees for their technical/operations skills, their leadership abilities, and their business acumen.

Macy (forthcoming, 2008), Risher (1999), Risher and Fay (1995), and Lawler et al. (1995) all indicate an increasing popularity in the work systems trend of PFV and SBP systems, as these financial reward systems are expected to enhance organizational and employee flexibility and produce higher levels of performance. Because of the developmental nature of these reward systems and their potential to enrich work (Hackman & Oldham, 1980), they are also expected to be associated with higher levels of employee engagement. Jenkins et al. (1992) report that most of the respondents in their study rated the SBP system as highly successful. Murray and Gerhart (1998) found SBP associated with improved productivity, labor cost, and product quality, but warn that its effectiveness is contingent upon adopting a holistic and integrated design.

The PFV system was designed at Site A by their site design team; however, the ABC Company's previous 21 skill block pay system (originating from the previous nine manufacturing designs at the ABC worksite and composed of technical, social, and team activities) was mandated from ABC's top management for Site A. This was required to maintain location-wide pay equity with the other nine business units located at the central manufacturing worksite. Therefore, the PFV that was proposed by the Site A design team and approved by their design steering group was not implemented at Site A. This was indeed a severe blow to all the employees at Site A. This "other pay system" (SBP instead of pay for business versatility or contribution) was a definite long-term design flaw. The required SBP system did not specifically recognize nor reward formalized leadership roles of SDWT members. In the long run, the hourly employees did not feel rewarded for their business knowledge and their required rotated leadership roles. This continues to be a problem at the site.

Recognition and Financial Reward Systems Action-Levers: Qualification/Certification of SDWT Operations Members (D3). Both of the PFV and SBP systems require skill verification and/or certification to insure that the SDWT members have indeed acquired the technical, team, and leadership skills mastery for which he or she is being paid and trained for. In most cases, the technical skills and formalized leadership roles are certified by other SDWT peers (not their own team) that include team and non-team member (The American Compensation Association & Wallace, 1990; Risher, 1999). Each Site A SDWT member appraised each of their peer team members on all of his/her tasks, team, and leadership skills to enable

placement in the new designed SBP system. This qualification and assessment system took approximately three months for Site A to implement and was very difficult and very emotional for the operations SDWTs and management to accomplish. In hindsight, this employee assessment system of every Site A operations SDWT employee was probably too early in the maturity and development process for each individual team member and the SDWTs as a whole.

Shared Leadership and Decision-Making/Empowerment Processes Action-Levers: Decision-Making, Problem Solving, Empowerment, and Employee Involvement (EI). SDWTs need to be given clear and specific autonomy regarding their decision-making powers. Usually, SDWTs are given “limited” decision-making powers in the early stages of their technical, social, and business maturity. This shared leadership through re-distribution of power and control to make work and business-related decisions was gradually enhanced to match their levels of SDWT maturity and problem-solving capabilities. The SDWTs autonomy and freedom ranged from the control over work to the design and implementation of equipment changes on the production line. In some cases, this may even involve decision-making powers with limits placed on the monetary value of the decisions. Personnel decisions ranged from targeted selection (by which SDWTs choose their team members) to disciplinary issues. SDWTs can recommend severe disciplinary sanctions, such as placing employees on probation or even recommend firing them; however, management is responsible for making the final call on all disciplinary actions.

The decision-making matrix diagram shown in Appendix B describes how the Site A decision-making process was gradually shifted from higher management and professional staff to the 23 SDWTs. The “S” indicates, where the decision was made at the start of the HPWS design effort. The “X” indicates, where the decision was to be made at the end of the design implementation #2 phase (21 months later). Some decision categories may have more than one “S” or “X” as some decisions are, and will always be, made at different levels depending on the business issue. In addition, some decisions (like price, formula mix or products, etc.) will always be made by management and professional staff and never by SDWTs. The levels of decision-making authority ranged from “10” representing the decisions that are made by management; level “5” being the decisions made by the SDWTs; and, finally level “1” representing decisions made by individual team members. This was indeed an important design element in that this decision-matrix grid explicitly indicated the level and degree of employee

empowerment at Site A. To quote the senior vice president for HR of ABC Company from a local newspaper, “Better decisions get made if in fact you can move those decisions closer to where the actual work is performed.”

Each of the 23 SDWTs was empowered to make decisions and solve problems that affected its work including daily planning schedules and work assignments. SDWT members performed personnel and administrative roles and recommended action to management when disciplinary procedures were called for. The management took all formal disciplinary actions at Site A.

Shared Leadership and Decision-Making/Empowerment Processes Action-Levers: Formalized and Periodically Rotated Leadership Roles for Operations and Process SDWTs (E2). To take the important step toward self-regulating team maturity (Goodman & Associates, 1986; Ketchum & Trist, 1992; Manz & Sims, 1987, 1993; Orsburn, Moran, Musselwhite, & Zenger, 1990; Shonk, 1992; Wheelan, 2005), each hourly employee and professional staff SDWT member from the 18 operations SDWTs, and some of the process white-collar SDWTs (see Fig. 5) were trained in formalized and rotated “inside the business” leadership roles to be performed at the business center in order to enable self-regulation to be implemented. A major portion of the coaches’ initial coaching and development task was to train SDWT members to effectively perform the following eight formalized and rotated leadership roles: (1) work assignor/administrator; (2) product/service quality; (3) preventive maintenance; (4) training/retraining/coaching/development; (5) personnel; (6) business communications; (7) process technology specialist; and, (8) safety and environment. All of these eight leadership roles were formalized and periodically rotated among team members. Also, the safety and environment leadership role was performed “inside” and “outside” their team and the business. This leadership role in each SDWT involved coordination and communication across the other nine business centers and across the different shifts at the large manufacturing site for site-wide safety/environment responsibility. Altogether, these eight formalized leadership roles were periodically rotated among all operations and some connected process SDWT members (operations SDWTs: every 9–12 months for operations SDWTs and every 6–9 months for process SDWTs). Some of these design processes and systems created for the HPWS design are indicated in Appendix A. Coupled with the “decision-making matrix” (Appendix B) and redistributing the former supervisors or managers role into these eight rotated leadership roles performed by all of the operations and some of the process SDWTs were certainly two of the major design mechanisms for employee empowerment to occur.

This ends the detailed review of the 15 action-levers designed and implemented at Site A as part of their HPWS transformation effort. The next section reports on the results or outcomes of the study.

ORGANIZATIONAL OUTPUTS/RESULTS

Any organizational transformation effort must eventually result in improved organizational performance and employee engagement. Many authors have prescribed appropriate measures for the assessment of organizational change (e.g., Cummings et al., 1977; Kling, 1995; Macy & Mirvis, 1982; Nadler & Tushman, 1988; Seashore, Lawler, Mirvis, & Camman, 1983). This literature suggests that a multiple stakeholder perspective is essential in assessing organizational transformation and design. However, organizational transformation field studies are often constrained by unique contextual situations that researchers have little control over. This HPWS field study concentrates on three different types of organizational effectiveness outcomes (see Fig. 1):

1. Hard organization performance (productivity and product quality);
2. Employee behavioral (turnover and accidents) measures; and
3. Some aspects of the employee engagement.

The objectives of the ABC Company transformation effort were clearly stated in the vision direction developed by the steering group for Site A. Some key organization performance results⁴ that the ABC Company hoped to achieve by the HPWS transformation effort were the following: (1) excellence in cost, quality, and customer service; (2) excellence in safety; (3) minimizing harm to the environment; (4) business partnership and commercial astuteness for each employee; (5) decision-making at the most effective level; and, (6) a motivated workforce where the SDWTs would assume ownership and direct responsibility for business results. These outcomes or performance indicators match Nadler and Tushman's (1988) recommendations for assessing organizational performance and effectiveness. All these indicators had various forms of both quantitative and qualitative measures.

However, because of issues related to timing and coverage (discussed later), we refer to this data and analysis in the discussion section of this chapter. Our hypotheses for this longitudinal quasi-experimental field study follow in the next section of this chapter.

THE HPWS HYPOTHESES

On the basis of the theoretical and empirical literatures presented above as well as the contextual issues unique to the ABC Company, the research hypotheses for this SDWT and HPWS field study are proposed and discussed. The time frame for the ABC transformation and implementation phase, as well as the time for which data were available determined the time frames used to test the study's hypotheses.

Typically, one common but key indicator of organizational performance is labor productivity. Improvements in labor productivity can be a key objective in the implementation of a HPWS design. However, learning curve effects (Epple, Argote, & Devadas, 1991) could be expected to have played a role in the early stages of the ABC Company design implementation, and thus resulted in initial fluctuations of ABC Company labor productivity levels. Overall, assessing improvement in "hard" labor productivity data (as a measure of organizational effectiveness) has been rare in the organizational change and design literature. Often, self-reports or supervisory reports of productivity have been used as a measure of organizational performance improvement. Both the theoretical and empirical literatures suggest that the HPWS design effort is associated with improved labor productivity. The following hypothesis is therefore proposed in relation to the ABC Company/Site A labor productivity:

Hypothesis 1. Site A will have improved labor productivity over 54 months.

Many organizational change and design studies reported in Table 1 indicate that product or service quality improved as a result of the change effort. In fact, improved product quality could be considered the most consistent result of HPWS design efforts.

Hypothesis 2. Site A will improve its product quality over 54 months.

Hard employee behavioral outcomes may be measured by absenteeism, employee turnover, safety, and several other behavioral measures (Macy, 1982; Macy & Mirvis, 1982). Literature on SDWTs suggests that the safety level has improved and the number of accidents has decreased, particularly when safety is an important objective of the change effort, as in the Rushton experiment (Goodman, 1979; Trist et al., 1977). According to Macy and Mirvis (1982), safety is measured by the ratio of the number of incidents that took place within a specified time to the number of employees. The incidents that have taken place are classified into OSHA⁵ recordable (i.e., major and

minor incidents). The number of hours lost due to the incident is indicative of both its severity as well as the costs incurred by the organization. Given the above definitions and literature, the following hypotheses are proposed:

Hypothesis 3A.1. Site A will have fewer safety incidents (minor) after implementing the HPWS design changes (over 54 months).

Hypothesis 3A.2. Site A will have fewer safety incidents (OSHA recordable) after implementing the HPWS design changes (over 54 months).

Hypothesis 3A.3. Site A will have fewer days lost due to accidents after implementing the HPWS design changes (over 54 months).

Organizations have experienced increases in employee turnover in some of the empirical field studies reported in Table 1. While some authors (i.e., Cordery, Mueller, & Smith, 1991; Wall, Kemp, Jackson, & Clegg, 1986) have suggested that increases in employee turnover may be due to external factors (such as the labor market and location of the organization), it is necessary to recognize that all employees do not view employee involvement, empowerment, and self-regulation positively. Arguments presented by Hulin and Blood (1968), Locke and Schweiger (1979), and Wagner (1994) indicated that individual differences may exist and employees may opt out of the organization. We expect employee turnover to rise in the initial stages of the ABC transformation effort at Site A and stabilize later. Therefore, the following hypothesis is proposed:

Hypothesis 4. Site A will experience reduced total employee turnover over 54 months.

Research Assessment Data

Several types of research data were obtained for this longitudinal quasi-experimental field study. These include hard record data of production and product quality over 54 months⁶ and employee behavioral data consisting of safety data and employee turnover data over 54 months. Specific definitions of the hard performance data indicators are described in Appendix C.

Assessing Changes and Change Processes

A clear identification of the change outcomes, the criteria to be measured, and the frequency of the assessments are necessary in any change effort. Moreover, the dissemination of the results to the employees involved in this

ongoing effort is also important as their judgments are an essential factor to assert the real success of an organizational change effort (Pettigrew et al., 2001). Since the impact of the HPWS design feature bundle is expected to provide superior results as a whole more than the sum of its parts, three types of organizational outcomes are assessed. The productivity and quality of the products manufactured at the Site A level are assessed according to the six time frames timeline described above in order to assert the overall and intermediary impacts of the 5-year transformation effort. The individual level is utilized with behavioral indicators such as employee turnover and safety. Finally, employee engagement outcomes such as job satisfaction and employee motivation are examined once the HPWS action-levers are implemented at Site A.

A baseline employee attitude survey was administered to all Site A employees as part of the diagnostic efforts, and a Time 2 Site A employee survey (with 63 matched cases) was administered about 14 months later. Due to business constraints, the Time 2 employee survey could not be administered to all Site A's employees. The measures used in the survey and analyzed in this longitudinal field study are available from the authors.⁷ Because the Time 2 survey was administered to a limited number of employees during the implementation phase, the survey data was analyzed in an exploratory fashion and the results are reported in the discussion section of this chapter.

Research Methods

As discussed earlier in this article, several types of organizational performance, employee behaviors, and employee engagement data were collected in this longitudinal quasi-experimental research study. Production, product quality, and behavioral data were analyzed using the time-series regression method (Pindyck & Rubinfeld, 1991) because of the relatively short time series.

Based on the longitudinal quasi-experimental nature of the research study and the time frame of the HPWS organizational transformation and design effort, ABC Company/Site A performance data were split into six separate time periods, each of which were 9 months (see Fig. 3). Some preliminary HPWS change and design work was done during the initial two stages. Of the remaining four time periods, one period coincided with the organization design phase, while two coincided with the implementation phase. The last period was pre- and post-implementation. A time-series regression analysis

was performed to compare each of the above time periods with each of the other time periods to determine if any change had occurred. This analysis was performed on total absolute production, labor productivity, product quality, and the employee behavioral data.

The SAS Autoreg procedure was used to analyze the data. This procedure analyzes time series data and tests for autocorrelation in the data. If autocorrelation exists, the data are lagged by the first level at which they exist. Each time period was dummy coded for each comparison. The time series regression was run with this dummy-coded variable as an independent indicator. Each time period was thus compared with every other time period. The models were first run with only the change indicator as the independent measure, and the Durbin-Watson statistic (Pindyck & Rubinfeld, 1991) obtained. The appropriate level to which the data was to be lagged was thus obtained. Given that monthly ABC Company/Site A hard performance data were being used, lagging the data to the 12th level would have accounted for seasonality. However, this would have resulted in the loss of several data points in a relatively short time series.

Pairwise *t*-tests were used to determine if there were significant changes in employee attitudes from the baseline measurement at Time 1 compared to Time 2. There were only 63 matched employee cases between the Time 1 and Time 2 measurements. The analysis included only these matched cases.

RESULTS

The HPWS change effort resulted mostly in non-significant changes (no change in 13 comparisons; significant declines in 2 comparisons) in labor productivity. However, the signs of the change coefficients were negative for 14 of the 15 comparisons made. Therefore, Hypothesis 1 was not supported. The results of the test for Hypothesis 1 are shown in Table 2.

However, the above “no change” results focused on direct labor productivity. Since a transformation effort may involve the use of additional resources in the short term, a similar analysis was performed using the indicator “absolute case quantities.” This additional analysis (not shown here) also indicated mostly non-significant change (significant improvements in three comparisons; non-significant improvements in eight comparisons; non-significant declines in four comparisons). However, Site A did see a 30,000 case production increase (from approximately 190,000 to 220,000 cases) per month over the 54 months (before and after period) of the

Table 2. Labor Productivity and Product Quality Results at Site A of ABC Company.

| Labor Productivity Results at Site A of ABC Company Comparison Time Periods | Labor Productivity Change Coefficients and Significance Level | Product Quality Change Coefficients and Significance Level |
|---|---|--|
| 1. Month (0-9) to month (9-18) | 24.88 | 0.01** (<i>t</i> = 2.7) |
| 2. Month (0-9) to month (18-27) | -5.33 | 0.01* (<i>t</i> = 1.9) |
| 3. Month (0-9) to month (27-36) | -20.99 | 0.01* (<i>t</i> = 2.1) |
| 4. Month (0-9) to month (36-45) | -28.20 | 0.01*** (<i>t</i> = 2.6) |
| 5. Month (0-9) to month (45-54) | -28.21 | 0.01** (<i>t</i> = 2.4) |
| 6. Month (9-18) to month (18-27) | -30.21 | -0.002 |
| 7. Month (9-18) to month (27-36) | -35.85 | 0.003* (<i>t</i> = 1.8) |
| 8. Month (9-18) to month (36-45) | -53.09*** (<i>t</i> = -2.6) | 0.01*** (<i>t</i> = 6.2) |
| 9. Month (9-18) to month (45-54) | -53.09* (<i>t</i> = -1.9) | 0.01*** (<i>t</i> = 5.6) |
| 10. Month (18-27) to month (27-36) | -5.63 | 0.01** (<i>t</i> = 2.3) |
| 11. Month (18-27) to month (36-45) | -22.87 | 0.01*** (<i>t</i> = 4.8) |
| 12. Month (18-27) to month (45-54) | -22.88 | 0.01*** (<i>t</i> = 4.4) |
| 13. Month (27-36) to month (36-45) | -17.24 | 0.003* (<i>t</i> = 1.9) |
| 14. Month (27-36) to month (45-54) | -0.30 | 0.002 |
| 15. Month (36-45) to month (45-54) | -0.01 | -0.001 |

**p* < 0.10

***p* < 0.05

****p* < 0.01

study. This was indeed a key positive performance indicator for the company and the business at Site A.

Product quality was expected to improve over the period of analysis according to Hypothesis 2. Three types of product defects defined in Appendix C were recorded to measure product quality. Data obtained from the measurement of the three types of defects were aggregated to determine the “percentage free of defects,” a measure of total product quality (TPQ). The analysis was performed on all three types of Site A’s product quality defects as well as on TPQ. Results of the analysis on TPQ are presented in Table 2.

There were significant positive product quality improvements (significant improvements in twelve comparisons; no significant declines; three non-significant decline comparisons) in the “percentage free of minor defects” and in the aggregate TPQ measure. These product quality improvements took place throughout the study. Since overall product quality improved at ABC Company/Site A, Hypothesis 2 was supported. However, quality change coefficients were very small. These results will be discussed in the next section of the chapter.

Analysis of the safety data, both in terms of the number of accidents and the number of days lost due to accidents indicated that there were non-significant changes in safety (i.e., no improvements nor declines). This lack of support for hypotheses 3A.1, 3A.2, and 3A.3 is both good and bad news! In many instances, SDWTs implementation can have a negative impact on employee accidents (Macy, 1982). On the other hand, Goodman (1979) found coal mine safety to have improved through the implementation of SDWTs at Rushton. The change coefficients for each of the three types of accidents (minor, OSHA recordable, and days lost) were also very small. Therefore, ABC Company/Site A’s safety performance did not change. The reader must remember that Site A’s safety rate at the beginning of the change effort was excellent (less than 2 percent OSHA recordable). These results are discussed in the next section.

Hypothesis 4 stated that the ABC Company would experience reduced employee turnover. Voluntary, involuntary, and total employee turnover data were analyzed. Analysis revealed that there were non-significant changes (no significant increases or declines) in all three employee turnover categories. Once again, the coefficients in all behavioral cases were small or near zero. Hypothesis 4 was therefore not supported. Once again, remember — Site A’s turnover rate at the beginning of the HPWS effort was exemplar (below 2 percent per year in all turnover categories).

DISCUSSION OF RESULTS

A summary of the hard organizational performance and employee behaviors results at Site A is presented in Table 3.

Out of six hypotheses tested in this longitudinal HPWS field research study, only one (the hypothesis 2 on improved product quality), was scientifically significant and entirely supported. The remaining five hypotheses tested exhibited no significant change – “neither decline nor improvement”! Even in the product quality improvement data, the change coefficients, though significant, were small. This discussion must therefore focus on these surprising organizational transformation results. Each result will be discussed individually followed by an overall summary and conclusion.

First, the lack of scientific and significant positive changes in labor productivity may be explained by the initial increase in the labor (employee) pool sizes for each SDWT (to provide enough training time for employees to become multi-skilled and learn the required rotated leadership roles). Following this initial employment increase, the organization design called for a gradual decrease in labor pool sizes to below pre-change levels.

Analysis of absolute case quantities resulted in mostly positive change coefficients. There were significant overall production improvements between the following three comparisons: months (0–9) compared to months (36–45); months (18–27) compared to months (36–45); and months (27–36) compared to months (36–45). Three change coefficients were negative, two of which involved months (9–18). As shown in Fig. 6, the mean number of cases produced per month at Site A increased initially from 190,000 cases to about 209,000 cases. During design months, 13 to 23, the number of absolute cases decreased (from 209,000 to about 185,000). However, during implementation months, 31 to 54, the number of cases improved from about 185,000 to approximately 220,000 cases. After an initial improvement in productivity, this is the classical “*J*-effect” mentioned earlier (Katz & Khan, 1978, p. 297). In summary, this trend line (the dotted line in Fig. 6), even though there was an improvement from approximately 190,000 to 220,000 cases per month, was not scientifically significant.⁸ However, to the company, this was a great improvement worth several million dollars!

The hypothesis on improved product quality at ABC Company/Site A was supported. Product quality did significantly improve with the minor quality category accounting for the gains. Even these improvements came while the change effort was being implemented. The reader may recall that the company shifted the responsibility for product quality to the line

Table 3. Summary of Site A HPWS Transformation Results.

| No. | Description | Results ^a | Comments |
|--|-----------------------------------|-------------------------------------|---|
| <i>I. Financial Performance: Production and Productivity</i> | | | |
| 1. | Labor Productivity | No change (13); Negative (2) | Direct Labor Pool sizes temporarily increased for training Exploratory analysis of absolute production quantities indicated no changes in 12 comparisons, and positive significant change in 3 |
| <i>II. Financial Performance: Product Quality</i> | | | |
| 2a. | Percent Free of Major Defects | Positive change (12); No change (3) | Total Product Quality improvements were found because of improvements in the minor defects category. |
| 2b. | Percent Free of Critical Defects | | Both critical and major defects categories did not improve because of ceiling effects |
| 2c. | Percent Free of Minor Defects | | |
| 2d. | Percent (all) Free of any Defects | | |

III. Behavioral Performance:

Safety

| | | |
|-------------------------------------|-----------|--|
| 3a. Minor Accidents | No Change | Ceiling Effects (already very close to exemplar) |
| 3b. OSHA Recordable Accidents | No Change | Ceiling Effects (already very close to exemplar) |
| 3c. Man-hours lost due to Accidents | No Change | Ceiling Effects (already very close to exemplar) |
| 4. Total Employee Turnover | No Change | Ceiling Effects (already very close to exemplar) |
| 5. Employee's Engagement | No Change | Ceiling Effects (already very close to exemplar) |

IV. Behavioral Performance:

Employee Turnover

V. Employee Engagement:

Employee Attitudes

Number of product cases produced (actual)/direct labor hours.

(a) Number of critical defects/inspected sample of the number of cases produced.

(b) Number of major defects/inspected sample of the number of cases produced.

(c) Number of minor defects/inspected sample of the number of cases produced.

(d) Total number of product defects/inspected sample of the number of cases produced.

(Number of accidents incidents/total monthly hours worked) \times 200,000/12.

(Number of accidents incidents/total monthly hours worked) \times 200,000/12.

Number of employee days lost/total workforce size \times number of monthly working days (for each month, for regular employees).

^a+ Indicates significant positive change; - indicates significant negative change; in rows 1 and 2, the results of 15 comparisons each are summarized. The numbers in the parenthesis indicates the number of comparisons that fall into that category (e.g., in row 1, there were three significant declines and 12 "no changes").

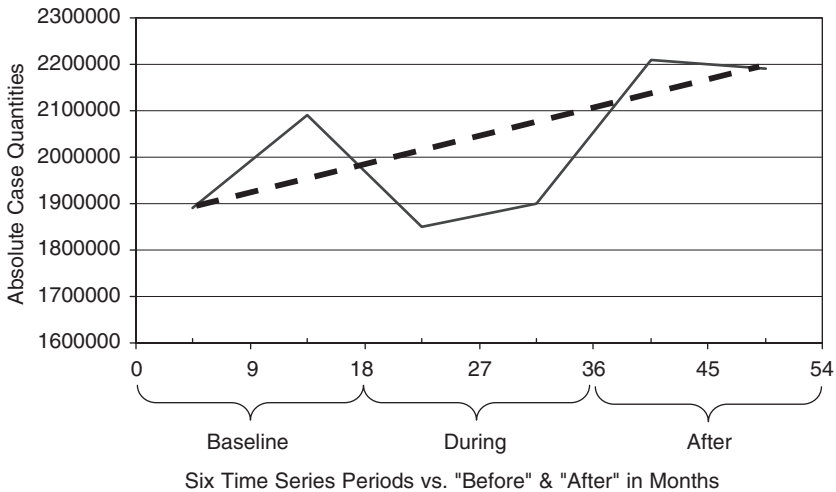


Fig. 6. “J-Curve” of Mean Absolute Case Quantities per Month Produced at Site A/ABC Company Over Six Time Periods – 54 Months. Note: Actual Case is the Solid Line.

employees during the HPWS change process at Site A. The other product quality categories (percent free of critical and major defects) were already very close to 100 percent (the classical ceiling effect) and therefore had very little to no room for improvement.

Recall that the Site A worksite was operating at an extremely high exemplar production and quality levels prior to the intervention and would be considered “great” by Collins (2001) based on the firm’s extensive history of high performance (e.g., safety – less than 2 percent OSHA accident rate; employee turnover – less than 2 percent); and employee satisfaction – 85th percentile or better). Therefore, “ceiling effects,” sometimes called “survival analysis,” (Greene, 1995; Kalbfleisch & Prentice, 1980; Nunnally, 1967; Tobin, 1958) were in evidence at the ABC Company and the Site A worksite with regard to OSHA recordable accidents, minor accidents, and employee turnover. Fig. 7 depicts the minor and OSHA recordable accidents at Site A. After an initial rise from about 3.5 percent to about 4.5 percent, minor accidents declined to below 2 percent. At the same time, there was a steady decrease in OSHA accidents to below 1 percent. Both of the trend lines shown in Fig. 7 were non-significant. We believe that both of the accident trend lines are tending toward zero (meaning zero accidents), which is due to the ceiling effect that was present from the start of the change effort.

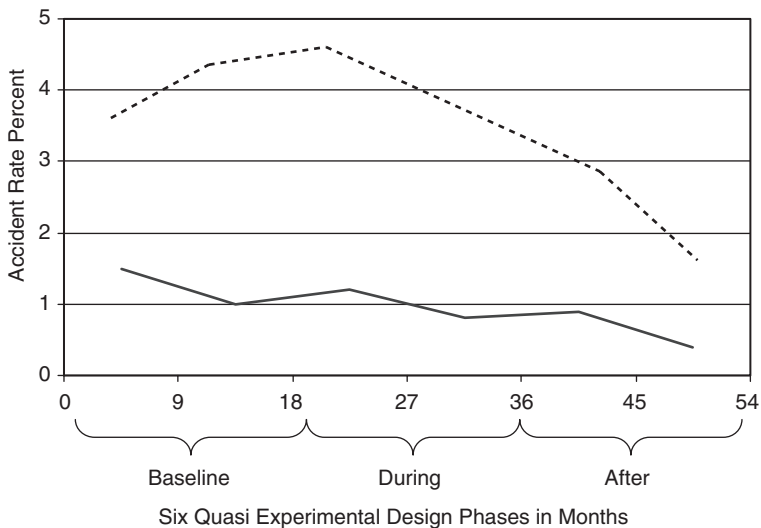


Fig. 7. Ceiling Effect of Minor and OSHA Recordable Accidents at Site A/ABC Company Over Six Time Periods – 54 Months. Note: Dashed Line is Minor Accidents, and the Solid Line is OSHA Accidents.

The ABC Company, given its long-time employee focus, had very low (tending toward close to zero) employee turnover and accident rates, which was maintained during and after the HPWS transformation effort. This is a good result! The reader must remember -- the ABC Company had been independently judged by *Fortune* magazine (over many years) to be one of the top 100 US based organizations to work for! In addition, all of their past performance indicators would indicate that they had already achieved “exemplar” (Collins, 2001) status.

To gain a better understanding of the effectiveness of the transformation effort, the researchers analyzed employee survey based data to determine if there were any significant changes in employee engagement measures, like job satisfaction, job involvement, job (work) motivation, team cohesion, and pay satisfaction. As indicated in Table 4, there was no change (non-significant improvements or declines) in employee attitudes regarding their engagement in the organization. Given that the Time 2 employee survey was administered only 14 months after the baseline survey, an initial employee attitudinal downturn in the form of the “J-effect” or curve (Katz & Kahn, 1978, p. 297) seems to have been avoided at ABC. Once again, this is a good employee result, especially due to the fact that employees were able to

Table 4. Results of Employee Engagement Measures at Site A of ABC Company: Descriptive Statistics, Pairwise *t*-Tests and Regression Results.

| No. | Employee Engagement Indicators | <i>N</i> | Mean at Time 1 | SD ^a at Time 1 | Mean at Time 2 | SD at Time 2 | <i>t</i> -value ^b | Sig. ^c | <i>N</i> ^d | <i>R</i> ² | Time 1 Coefficient | <i>t</i> -value | Sig. ^e |
|-----|--------------------------------|----------|----------------|---------------------------|----------------|--------------|------------------------------|-------------------|-----------------------|-----------------------|--------------------|-----------------|-------------------|
| 1 | Job Satisfaction | 63 | 6.0 | 0.75 | 5.9 | 0.75 | 0.708 | 0.482 | 63 | 0.12 | 0.35 | 2.9 | 0.01 |
| 2 | Job Involvement | 63 | 4.0 | 0.96 | 3.9 | 0.87 | 0.347 | 0.073 | 63 | 0.26 | 0.46 | 4.6 | 0.01 |
| 3 | Job Motivation | 63 | 6.1 | 0.77 | 6.2 | 0.57 | -0.317 | 0.752 | 63 | 0.30 | 0.41 | 5.1 | 0.01 |
| 4 | Pay Satisfaction | 63 | 4.4 | 1.58 | 4.3 | 1.55 | 0.614 | 0.542 | 63 | 0.34 | 0.57 | 5.5 | 0.01 |
| 5 | Team Cohesiveness | 63 | 5.1 | 1.15 | 5.1 | 1.19 | -0.321 | 0.749 | 63 | 0.24 | 0.51 | 4.4 | 0.01 |

^aSD indicates the standard deviation.

^b*t*-value is the computed test statistic.

^cSig. indicates the significance level.

^d*N* is the matched number of respondents at time 1 and time 2.

^eSig. means significance.

“opt out” of their initial ABC design effort and then be transferred to Site A, which had not yet begun their transformational effort.

In a purely exploratory fashion, and based on the analysis of covariance (ANCOVA) concepts, a simple regression was run, using the Time 2 employee engagement score as the dependent variable and the Time 1 employee engagement score as the independent variable. Our expectation here was that the Time 1 score would be a significant predictor of the Time 2 score. A high R^2 would imply that little change had taken place, whereas a low R^2 would indicate that *something* had really happened. However, the lack of a covariate would make it impossible to pinpoint the source of the change. Once again, the results of this analysis are presented in Table 4.

The R^2 s are all moderate to low, and range between +0.12 and +0.34 on all five employee engagement measures. These employee engagement results indicate that at an aggregate level, some compensatory effects account for the lack of significant differences between means at Time 1 and Time 2. These results may indicate that those ABC employees who were relatively happy with the status quo prior to the change effort were now relatively unhappy or vice versa. These results are also a possible indicator of *beta* or *gamma* change (Golembiewski, Billingsley, & Yeager, 1976; Thompson & Hunt, 1995) rather than *alpha* change. The pairwise *t*-test is useful in detecting alpha changes, but not beta or gamma changes.

In addition, another key lesson is the effect of employee turnover at the top of ABC management. The original US manufacturing vice president, the change champion who initiated the HPWS design efforts, subsequently moved up the ABC Company management ladder to be responsible for worldwide manufacturing for the entire ABC Company. The managerial replacement for the North American champion was never able to either accept or adopt the necessary core values, philosophies, and principles of the HPWS transformation effort. Therefore, this lack of a “consistent” top management champion during the two design implementation periods was detrimental to the long-term HPWS change and design effort. And finally, ABC Company’s long-standing focus on its employees provided a ceiling effect on the behavioral and employee engagement indicators.

Recall that this research was initiated to question the role of organizational design, transformation, development, and change efforts in an exemplar firm. One could argue that based on our findings, a firm can only be “so good”! However, this would assume that the ultimate goal of any change effort is to affect productivity, safety issues, employee turnover, and product quality. The firm in this study had pre-existing core values, philosophies and principles relating to the importance of its employees in

conjunction with maintaining high levels of performance. This HPWS transformation effort brought the worksite more into alignment with these core values, philosophies, and principles, while simultaneously bringing the firm's key internal and external customers and suppliers closer to the business.

By changing the organizational structure from a tall and mechanistic structure to a flatter and organic structure (e.g., two layers of management were removed from the original structure) and by empowering employees in these SDWTs, the firm was able to sense changes in the environment quicker than firms without the HPWS integrated and bundled design described herein; thereby creating an organizational capability that fosters quicker reaction to the environment (Galbraith, 1994, 2005). This was accomplished without any significant negative changes in its exemplar high performance, or any employee turnover by using state-of-the-art direct employee participation processes and parallel employee involvement structures implemented with the site's bundled 15 design features. Therefore, the ultimate performance effects of this massive organizational transformation effort are difficult to account for, but should be interpreted positively. Again, the HPWS and SDWT integrated and bundled design was implemented without any significant negative effect on previous company or Site A high-performance metrics.

CONCLUSIONS

This 5-year quasi-experimental field study while contributing to the work innovation, transformation, and design fields also illuminates an area of organizational design and change research that has not been effectively addressed and has implications for future research. Perhaps, our view of organizational performance has been too focused. On one hand, many of the existing measures of organizational performance were not found to be significantly and positively changed in this study. However, on the other hand, qualitative data suggests that the intervention was considered successful by the organization and their employees. New research should address this gap in the ODC literature. How do we assess the effects of organizational transformation efforts in exemplar organizations? Do traditional transformation measures apply when we consider ceiling effects on HPWSs, especially when the transformation effort is of the scale described in this chapter? How do we build and design organizations for constant change?

These questions are especially relevant if we are to take Farias' (2005) and Lawler and Worley's (2006) recent thesis seriously: that organizational

effectiveness can only be sustained when organizations are “built to change.” An organization that is being built and designed to change requires the coordination of multiple and integrated non-permanent structures, systems, and processes that are constantly changing while producing high levels of current performance. Lawler and Worley’s (2006) argument is especially relevant when we consider the historical inability of many visionary and the so-called “high performing firms” to sustain their levels of effectiveness and to seek temporary competitive advantages.

Additionally, this longitudinal quasi-experimental design field study of integrated and bundled HPWS and SDWTs transformation effort presents an analysis of hard organizational performance data and employee behaviors together with some employee engagement data from the ABC Company and thus makes an important contribution to the organizational innovation, change management, organizational transformation and design, and development literatures. Indeed, the variety in terms of types of hard organizational performance data used in this study is rather rare in the literatures on SDWTs and HPWSs. Our field study also took a holistic, integrated, and bundled view of organizational transformation and design. Rather than isolate the effects of SDWTs on organizational performance, this field study investigated what prior research had called for – the overall HPWS-bundled organization design perspective and focused on organization integration and fit of the various design features (Huselid, 1995; Woodman, 1989).

Based on the findings of our research, the ABC Company was able to move toward a HPWS by integrating a business center design directly linked to 23 (connected white-collar resources and operations) then directly coupled to the other 12 design features to form an integrated and bundled HPWS design. This was accomplished without any significant negative changes and many positive changes in ABC’s overall performance. The reader must remember that each of the 18 operations SDWTs increased their team size by one or two team members (due to the training and development requirements) during the two design implementation phases (the 21 last months) to enable the multi-skilling, leadership roles, and business training to be accomplished. In the long term, beyond the formal assessment period, these SDWT crew sizes were reduced and became smaller than the original crew sizes before the design effort started. This later period is not included in the labor productivity data and consequently the increased number of cases per month would have been positively significant using the time-series analysis.

While these research and design issues are a cause for concern, they do provide some valuable lessons for practitioners, managers, and

academicians. A key lesson from this research study was the need to manage the process of transformation appropriately. ABC Company took care to ensure that a very large and significant number of employees had direct employee involvement and participation in the HPWS design and the implementation phases. There was by design, formal and direct employee participation via parallel employee decision-making structures and processes. The goal was to create self-directed work teams and a HPWS and this approach was leveraged from the onset.

All in all, the benefits of this “built to change” organization (Lawler & Worley, 2006), that the ABC Company continues to realize at the Site A worksite into the 21st century from the HPWS design, seemed to be worth the cost. Site A reached and surpassed the six (excellence in cost; quality; safety; business partnerships and commercial astuteness for employees; lowering of decision-making; and a motivated workforce) objectives set for the HPWS transformation effort. However, without the overall bundled, holistic, and integrated HPWS approach to organizational design at the ABC Company, the results could have been very disappointing at best.

At the end of the two design implementation periods, the following organizational performance results were evident: (1) product quality improved; (2) the number of absolute cases produced increased by 30,000 per month; (3) safety (both OSHA and minor accidents) improved; (4) costs were lowered by reducing the number of management and staff employees (all without any layoffs), and product manufacturing costs were lowered by 6.5 percent; (5) the number of management levels and the number of management personnel layers decreased by two (from six to four⁹ hierarchical layers); (6) both management, professional staff, and hourly employees were much more commercially astute about the business and their external business environment; (7) management had successfully shared leadership roles (re-distribution of power and control) with the SDWTs; (8) employees were more multi-skilled; and, (9) accountability, responsibility, and decision-making had been lowered in the organization.

It is important to note that the use of the usual two or three time periods would have removed our ability to study both the “*J*-effect” and the “ceiling effects”; however, we found evidence for both of these. We analyzed both the “before” and “after” time periods, and this increase in labor productivity was indeed significant (30,000 absolute cases per month). In our view, ceiling effects regarding the previous organizational performance data at the ABC Company prevented most of the hypotheses from being scientifically and significantly supported in this study. The lack of significant improvements in labor productivity is explained by the timing of the measurement

and the temporary addition of employees per SDWT. Again, one of the goals of the study was to examine the entire change process effort (e.g., 54 months versus two or three points in time) and its consequences.

We believe the above nine success factors seem to have made the integrated and bundled HPWS transformation effort a success. SDWTs by themselves, we believe, without the other 14 action-levers (especially the business center concept), would have been a failure! If the shift to SDWTs has made the work much harder for many employees as witnessed earlier, workers also found it more intrinsically rewarding. One of the Site A operations SDWTs saved \$100,000 in the first year of implementation by taking over the use of temporary workers, while another operations SDWT saved \$700,000 when two team members took on the task of expeditors!

We think the ABC Company and its manufacturing division, especially Site A, has become a built to change organization for the 21st century. As Lawler and Worley (2006, p. 304) state, "To become a built to change organization, a firm must shift its members perceptions about the importance, frequency, ease and desirability of change. Further, it must implement changeable forms of each organizational design features." We believe the ABC Company did just that and therefore continues to be an "exemplar" organization with great organizational effectiveness. As of 2006, the ABC Company continues to be ranked in the *Fortune* top "100 companies to work for"! Overall, at this "after" stage (20 years after the ABC Company transformation effort began and 11 years after the complete implementation of the HPWS design at Site A), it seems that the integrated and bundled HPWS transformational design effort of Site A was successful.

NOTES

1. No confounding or extraneous changes in the company or worksite during the study's time period was present (e.g., manufacturing technologies, information systems). For example, the company purchased a product line from another firm, but only added 155 employees. Finally, no social, political, or economic upheavals occurred during this time. This can be verified by the fact that the researchers were present throughout the study period.

2. Later became the vice-president for North American manufacturing. During the 5-year project time period, the work site had two steering groups: one for the design phase, and the second for the implementation phase.

3. ABC Company never implemented autonomous operations SDWTs because of a decision by ABC's top management.

4. Specific quantifiable goals were set.

5. OSHA stands for Occupational Safety and Hazards Administration, which requires organizations in the United States to record and report all accidents of a major nature.

6. Because this is a field study, 10 months of this data had to be extrapolated due to the fact that some of the data prior to the change effort could not be obtained.

7. All scales were 0.60 or greater. All items and scales were taken from the Michigan Organization Assessment Questionnaire (see Camman et al., 1983).

8. Recall that multiple time periods were used rather than solely using “before” and “after.” Had we used only “before” and “after” time periods, this 30,000 cases per month increase would have been a significant increase in productivity (see Fig. 6).

9. The HPWS design planned for the site to go from six to three hierarchical levels; however, the site never managed to eliminate the coaches and have autonomous operations SDWTs. This was due to top ABC Company management unwillingness to risk personal and organizational assets and resources.

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3. The quantitative data were taken from a Texas Tech University, Rawls College of Business, Area of Management, dissertation while the second author was a Ph.D. student there.

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APPENDIX A

Table A1. Critical Demographic, Process, and System Characteristics of Successful SDWTs in Supply-Chain Organizations: Benchmarking 105 North American Traditionally Designed and HPWOs (SIO: 1991–2005)^a.

| | Percent or Other Indicator |
|--|----------------------------------|
| 1. Average age and range of SDWTs (semi-autonomous and autonomous) | 13 years (range = 4 to 32 years) |
| 2. Hourly or non-exempt employees performing required leadership roles in SDWTs | 69 |
| 3. SDWTs leadership roles: How handled – required rotated bias | 53 |
| 4. Length of SDWT required leadership roles rotated: when rotated: | |
| a. More than 12 months | 32 |
| b. 9–12 months | 27 |
| c. 3 months or less | 27 |
| 5. Average percent of total business’s workforce covered by SDWTs: | |
| a. Total system workforce | 61 |
| b. White-collared salaried workforce | 39 |
| c. Wage/hourly workforce | 67 |
| 6. Integration of Maintenance (light to medium – NOT heavy) into the operations SDWTs | 74 |
| 7. Average Size of SDWTs | 17 People |
| 8. Average number of semi-autonomous SDWTs per coach | 2 Teams/per coach |
| 9. Average span of control per coach | 34 People |

Table A1. (Continued).

| | |
|---|-------------------------------------|
| 10. Average number of total coaches per business (wage and white-collar SDWTs) | 24 Coaches |
| 11. Semi-autonomous SDWT coach responsibilities defined as: | |
| a. A “process area” across shifts | 46 |
| b. Around a shift across a process area | 21 |
| c. A line within a shift | 17 |
| 12. Does semi-autonomous SDWT coach work on same shift as (his/her) SDWT? | 100 (Yes) |
| 13. SDWT: | |
| a. Average number of <i>technical tasks</i> performed by SDWT | 9 Tasks (hard skills) |
| b. Average number of <i>business/team activities</i> performed by SDWT | 12 Activities (projects, etc.) |
| c. Average number of team <i>administrative roles</i> performed by SDWT | 7 Roles (scribe, facilitator, etc.) |
| d. Average number of <i>formal leadership roles</i> performed by SDWT (previously by supervisors or managers) | 8 Roles (work assignor, etc.) |
| 14. Business SDWTs resulted from: | |
| a. Re-design of Business | 59 |
| b. New Design of Business | 25 |
| c. Work Team Evolution | 16 |
| 15. Of a typical workday, what percent of SDWT team members time spent on: | |
| a. Operating/maintenance/technology | 44 |
| b. Leadership, business administration and other important non-operating work activities | 56 |
| 16. How often do SDWTs meet? | |
| a. Monthly | 49 |
| b. Weekly | 44 |
| c. Daily | 39 |
| d. Quarterly | 35 |
| e. Annually | 9 |
| f. Semi-annually | 4 |
| 17. Average number of SDWT meetings per year | 127 Meeting/year |
| 18. Average number of minutes of SDWT meetings per year | 4,898 min/year |

Table A1. (Continued).

| | | |
|---|-----------------|---|
| 19. Percent of work year hours spent in SDWT meetings? | 4 | |
| 20. Pay systems for SDWTs: | | |
| a. Traditional | 46 | |
| b. Non-traditional: innovative pay system | 54 | |
| If the business has an innovative pay system: | | |
| a. PFDS (pay-for demonstrated skills) | 27 | |
| b. Gain sharing | 27 | |
| c. PFV (pay-for-versatility) | 23 | |
| d. PFK (pay-for-knowledge) | 8 | |
| e. Team bonus | 7 | |
| 21. Average number of pay systems per SDWT | 2 | |
| 22. All salaried workforce and SDWTs (non-exempt) | 45 | |
| 23. Has the business changed other processes and systems in support of SDWTs? | | |
| a. Changed other support systems and processes | 44 | |
| b. Measurement/evaluation system | 30 | |
| 24. Barriers to successful SDWT implementation: | | |
| a. Time/resources for training/re-training | 62 | |
| b. Resistance from supervisors | 52 | |
| c. Resistance from managers | 37 | |
| d. Resistance from unions | 14 | |
| e. Increased costs | 13 | |
| f. Other | 11 | |
| Average number of barriers per worksite (out of 5) | $\bar{X} = 2.6$ | |
| 25. Coaching/training/re-training and development hours | | 160 hours per employee per year for businesses with SDWTs |

^aSource: Taken from Macy (forthcoming, 2008).

APPENDIX B

Table B1. ABC Company/Site A Decision-Making Matrix to Ensure Employee Empowerment.

| | Levels of Decision-Making Authority ^a | | | | | | | | | |
|---|--|---|---|---|---|---|---|---|----|----|
| | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 Vacation schedule | | | S | | | | X | | | |
| 2 Overtime (packaging) | | | S | | | | X | | | |
| 3 Overtime (Proc./TRT) | | | | | | | | | SX | |
| 4 Training of associates (tech) ^b | | | S | | | | X | | | |
| 5 Training of associates (business) ^b | | | S | | | | X | | | |
| 6 Training of associates (social/team) ^b | | S | | | | | X | | | |
| 7 Task/role assignment | | | | S | | | | X | | |
| 8 SDWT safety problems/issues | | | | | | | | | | SX |
| 9 Site A business safety rules | | | | | | | | | | |
| 10 Corporate safety rules | SX | | | | | | | | | |
| 11 Initiate work orders (repairs) | | | | | | | | | S | X |
| 12 Initiate work orders (changes/DCA's) | | | | S | | | | X | | |
| 13 Signing of hot work permits | | | | S | | | | | | |
| 14 Breaks and lunch (running 480 min) | | | | | | | | X | | |
| 15 Team/individual standards | | | | | | | | X | | |
| 16 Update old/purchase new equipment | | | | | | | | X | | |
| 17 Update procedures (quality) | | | | | | | | X | | |
| 18 Update procedures (tech – i.e., LOIs) | | | | | | | | | X | |
| 19 Physical layout of machines | | | | | | | | | | X |

S = Beginning or baseline state; X = Design implementation # 2 phase scale where: 10 = Performed by management; 5 = Performed by SDWTs; and 1 = Performed by individual team members.

^aThere were a total of 98 separate decisions on the Site A decision-making grid. Only the first 19 are listed here.

^bSome associates will initiate and train on their own.

APPENDIX C

Table C1. Definition of ABC Company/Site A Organization Performance.

| ABC Company Performance Indicators | Corresponding Criteria in the Literature | Computational Formula |
|------------------------------------|--|--|
| I. Productivity | Labor Productivity | Number of cases of product produced (actual)/direct labor hours ^{a,b} |
| II. Product Quality | Product Quality | <p><i>Percent free of critical^c defects</i>: Number of critical defects/inspected sample of the number of cases produced</p> <p><i>Percent free of major^c defects</i>: Number of major defects/inspected sample of the number of cases produced</p> <p><i>Percent free of minor^c defects</i>: Number of minor defects/inspected sample of the number of cases produced</p> <p><i>Percent free of defects (all)</i>: Total number of product defects/inspected sample of the number of cases produced</p> |
| III. Employee Accidents | Employee Safety | <p><i>Minor</i>: (number of accidents incidents/total monthly hours worked) × 200,000/12</p> <p><i>OSHA recordable</i>: (number of accidents incidents/total monthly hours worked) × 200,000/12</p> |
| IV. Employee Turnover | Employee Turnover | <p><i>Days lost per employee</i>: Number of employee days lost/Total workforce size × number of monthly working days (for each month, for regular employees)</p> <p><i>Voluntary</i>: Number of voluntary turnover incidents/Workforce size (for each month, for regular employees)</p> <p><i>Involuntary</i>: Number of involuntary turnover incidents/workforce size (for each month, for regular employees)</p> <p><i>Total employee turnover</i>: Total number of turnover incidents/workforce size (for each month for regular employees)</p> |

^aDirect labor hours indicate actual hours spent by line employees who are directly involved in production.

^bDetermined by engineering standard of the line production.

^cCritical defects result in the entire batch being checked. Products with critical defects are scrapped; major defects result in rework; minor defects require investigation of the causes.