EXPLORING THE ROLE OF KNOWLEDGE IN SMALL BUSINESS TEAMS

by

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ABSTRACT

For several firms, significant performance improvements are resulting from the involvement of employee teams in the whole system of production activities. In the manufacturing industries, firms are involving production employees in the management process through Small Business Team (SBT) organization.

During transition from traditional management systems, firms adopting SBT organization act to expand employees' exposure to the body of theoretical, operational, analytical and integrational knowledge necessary for managing and improving product cost, output and quality performance.

Upon the maturity of SBT organization, groups of employees within SBTs design and execute the functional, administrative and managerial tasks necessary for improving performance despite technical, social and economic challenges. The company under study herein is developing and implementing SBT organization.

From the experiences of numerous organizations, performance gains are arising, not from the execution of existing functional, administrative and managerial procedures in team structures, but from the proactive development and collaborative application of all employees' theoretical, operational, analytical and integrational knowledge in the technical, social and economic aspects of production.

To ensure successful transition to participative management systems, such as SBT organization, firms must (1) redistribute organizational knowledge for the benefit of production employees and (2) increase the breadth and depth of channels available to production employees for the application of knowledge.

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INTRODUCTION

The competitive rewards of generating customer delight are intensifying given the rise of truly global product markets. Facing the challenge of dynamic and increasing customer expectations, firms are eliminating divisive functional structures and cumbersome management hierarchies in search of continuous operating improvements. For several firms, technical, social and economic improvements are resulting from the involvement of employee teams in the whole system of functional and managerial activities necessary for production. Such improvements argue strongly for experimentation with participative management programs, particularly among tradition bound manufacturers.

Although participative management programs often face daunting implementation obstacles, successful programs ultimately further collaboration between managers and production employees in the design and execution of organization strategy. With involvement in the development of strategic direction, production employees readily commit to tactical actions enhancing realization of organization objectives. Typically, objectives include generation of customer delight, improvement of process efficiency and maximization of financial performance.

At the forefront of manufacturing practice, firms are involving production employees in the management process through Small Business Team (SBT) organization. While developing, SBTs actively expand employees' theoretical, operational, analytical and integrational knowledge of the procurement, production and distribution functions necessary to satisfy the cost, output and quality requirements of relevant processes. Upon maturity, SBTs design and

execute the functional, administrative and managerial tasks necessary for improving the performance of relevant processes against technical, social and economic objectives.

The Next Century Rubber Company[1] (Next Century) is currently developing and implementing SBT organization. By examining recent academic research as well as the evolution and current standing of Next Century's "FOCUS" SBT, the complexities of integrating SBTs into plant systems become evident. Transition obstacles emerge while bounding, communicating and operationalizing the concurrently dynamic, heterogeneous and necessary:

- functional responsibilities of SBTs;
- administrative, and increasingly managerial, responsibilities of SBTs;
- educational and technical supports for SBTs.

From the experiences of numerous manufacturing organizations, including Next Century, major performance gains arise, not from the execution of existing functional, administrative and managerial procedures in team structures, but from the proactive development and collaborative application of all employees' theoretical, operational, analytical and integrational knowledge in the technical, social and economic aspects of production.

[1] Actual company name and location are under disguise.

THEORETICAL UNDERPINNINGS OF SMALL BUSINESS TEAM ORGANIZATION

After researching evolution from scientific management toward sociotechnical systems, firms are adopting Small Business Team (SBT) organization to enable and motivate production employees' application of knowledge for improvement of routine operations. The theory underlying SBT organization draws heavily from current definitions of the self-directed work team (SDWT):

> A group of employees who have day-to-day responsibility for managing themselves and the work they do with a minimum of direct supervision. Members of self-directed teams typically handle job assignments, plan and schedule work, make production and/or service related decisions, and take action on problems.[2]

With strategic guidance from management and technical assistance from engineering and administrative staff, members of SDWTs typically share responsibility for the completion of whole processes and perform multiple tasks in support of such processes:

> Whereas a traditional organization might be divided into groups of functional specialists, for example, SDWTs are usually responsible for delivery of an entire service or product, or they might be responsible for a geographic or customer base. This is done to create (wherever possible) small self-sustaining businesses that can be jointly managed by the organizational membership.[3]

Searching for immediate performance gains during the introduction of SDWTs, firms regularly stress the importance of structuring teams and initiating self-direction. However, focus on structuring teams distracts employees' attention

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[2][K.] Kimball Fisher, Leading Self-Directed Work Teams (New York: McGraw-Hill, 1993), 15.

[3]Ibid.

from the goal of team structure, improving business performance. Moreover, the promotion of self-direction without consideration of employees' knowledge deficiencies and team immaturity, generally results in (1) misunderstandings between plant managers and production employees regarding team capabilities and responsibilities as well as (2) strong indications of deteriorating plant performance from financial and productivity perspectives.

With attentions elsewhere, firms neglect the development and provision of educational programs for production employees. Ongoing education is essential to equip SDWT members with the basic knowledge necessary to generate satisfactory, and ultimately improving, business performance. Without concurrent access to knowledge regarding equipment capabilities, present processing procedures, quantitative analysis methods and prevailing techniques for integrating process improvements into existing operations, neither team structure nor self-direction provide the members of SDWTs with the competence necessary to generate substantial business performance gains.

Strong business performance derives from the effective design and efficient execution of functional, administrative and managerial tasks given the technical, social and economic circumstances present within the operating environment. Such circumstances include, for example, the (1) state of process interdependency, (2) stage of team maturity and (3) burden of inventory cost.

By invoking and paralleling small business operation, proper SBT organization reinforces the ultimate purpose of team structure and self-direction, improving business performance. Gains result from improvement in the design and execution of tasks given team member understanding of dynamic technical,

social and economic circumstances throughout the organization. Specifically, SBT organization emphasizes the development of collaborative activity and whole systems perspective through growth in the depth of knowledge present among all team members, and particularly among production employees:

> The SBT model recognizes that it is, in most cases, humanly impossible and generally uneconomical to expect any one individual to possess in-depth knowledge of and perform all the functional and managerial/ administrative tasks assigned to their team. The success of the SBT, however, rests on the combined skills of individual team members who as a group cover all the breadth, height and depth job dimensions needed to manage and effectively perform their assigned duties.[4]

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[4]Janice A. Klein, "Teams," in The American Edge: Leveraging Manufacturing's Hidden Assets, ed. Janice A. Klein and J. Miller (New York: McGraw-Hill, 1993).

FUNDAMENTAL RELATIONSHIPS BETWEEN TASKS & KNOWLEDGE

Competitive evolution is forcing change and flexibility in the patterns of integrating equipment, labor and material for production. But regardless of philosophical shifts from scientific management to lean production and beyond, the integration of resources during production continues to require the:

- performance of functional tasks;
- completion of administrative and managerial tasks;
- application of knowledge.

Within the context of manufacturing operations, functional tasks represent the direct and often physical activities necessary for production employees to, for example, truck input materials from inventory locations for processing, transform input materials into intermediate or end products, truck such products to locations appropriate for further processing or shipping, and conduct equipment maintenance activities.

Administrative and managerial tasks support the performance of functional tasks and represent the numerous activities of staff, management and, increasingly, production employees to schedule interdependent functional tasks, ensure necessary employee staffing, compile operating data and establish rational performance goals.

Knowledge represents the extent of capability within the organization to design, integrate, execute and analyze the functional, administrative and managerial tasks necessary for successful production. In simple terms, the performance of

any and every task requires knowledge. By increasing the absolute mass of knowledge within the organization, broadening the distribution of knowledge throughout the organization and augmenting opportunities for the application of knowledge, organizations achieve business performance improvement. Such improvements generally arise from modifications in the technical, social or economic workings of the organization. Given the far reaching impacts of knowledge across functions within organizations, attempts to narrowly define knowledge are futile.

Nevertheless, four branches of knowledge are easily discernible. To improve beyond status quo operating performance, organization's must understand the:

1.) theoretical specifications of current and alternative operations;

2.) operational intricacies and results of current operations;

3.) analytical mechanisms for establishing and evaluating the significance of the variance between optimal and current performance;

4.) integrational methods for developing solutions to reduce the variance and for harmonizing such solutions with the overall system of existing operations.

Given the continuing influence of scientific management practices, the distribution of theoretical, operational, analytical and integrational knowledge within the organization generally varies by employee classification:

> An individual's knowledge about any particular task typically falls within one of two areas - *operational expertise*, which includes how to best perform the task, or *analytic knowledge* which encompasses an understanding of the scientific principles underlying the task. These two aspects of task expertise often reside in different individuals in different functions: production employees generally possess the operational expertise, while analytic knowledge typically resides in the engineering organization.[5]

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[5]Ibid., 5.

However, transformation toward SBT organization shifts significant responsibilities, although certainly not all responsibilities, for originating performance improvement from management and technical groups to production employees. To obtain cost improvement, several firms are intentionally forcing the shift. From the corporate perspective, one anticipated benefit of SBT organization is often the saving associated with reducing requirements for clerical, management and technical staffing.

Unfortunately, production employees have historically faced exclusion from education beyond training for specific functions:

> Frederick Winslow Taylor, on the other hand, looked at the needs of mass production and proposed that the key to success was low cost labor. He designed a work system where engineers determine the optimal procedure and then standardize the processes so that jobs can be broken down into minute tasks. These tasks can then be laid out with detailed instructions which require minimal training to be performed routinely.[6]

Without broad education, production employees frequently do not possess the knowledge necessary to satisfy SBT responsibilities for generating technical, social or economic improvements. Thus, in transitioning from traditional to SBT organization, effort to expand the total mass of knowledge in the organization is not necessarily of importance. However, efforts to broaden the distribution of such knowledge across employee classifications and to provide production employees with channels to apply newly acquired knowledge are definitely critical to success:

> Polaroid employees use EARS (Environmental Accounting and Reporting System) for a number of purposes. . . . They have used the system to learn where and how their processes affect the environment. EARS has

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[6]Ibid., 8.

> provided leverage for those within the company to argue on behalf of continuous environmental improvements. Because "environment" can now be measured, environmental considerations carry more weight.[7]

Given varying degrees of process and task interdependence, the distribution of knowledge across the members of SBTs also influences performance:

> At times, a decision can be made by one person (either by a centralized figure or a delegated individual), while other situations call for a collective decision. Here again, management philosophy often determines how many people are involved, but other considerations also include who has the relevant knowledge and/or skills to make the decisions, and the urgency of the decision.[8]

Centralization of authority violates the participative philosophy underlying SBT organization, particularly with regard to the performance of routine tasks. Thus, decision making within SBTs is often either independent or collaborative. Assuming minimal task interdependence, independent decision making is both effective and efficient. As processes come to involve the simultaneous interaction of diverse equipment, for example, task interdependence generally increases. Assuming pressure for performance improvement as well as task interdependence, collaborative decision making is necessary given requirements for both the modification and the coordination of several employees' tasks. To originate business performance improvements, production employees must possess knowledge sufficient to successfully:

- determine the extent of task interdependency within the process under consideration;

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[7]Jennifer Nash et al., eds., "Polaroid's Environmental Accounting and Reporting System: Benefits and Limitations of a TQEM Measurement Tool," Total Quality Environmental Management (Autumn 1992): 13.

[8]Janice A. Klein, "A Reexamination of Autonomy in Light of New Manufacturing Process," Human Relations 44, no. 1 (1991): 30.

- assess the appropriateness of either independent or collaborative decision making for modifying current tasks;
- as appropriate, engage in either independent or collaborative activities improving upon the current organization and structure of tasks.

Completing such activities implies production employees' knowledge of the:

- technical, social and economic circumstances supporting the current organization and structure of tasks;
- organization's resources available for actualizing change;
- social systems necessary to gain consensus regarding possible change.

Understanding the pivotal role of knowledge in determining business performance is critical for the managers of firms evolving from traditional control systems. During transition, knowledge is often spread suboptimally across employees of different classifications. Moreover, production employees generally face access to few, if any, channels for applying knowledge in the workplace. As authority shifts to production employees, so must knowledge necessary to successfully execute authority:

> Authority without information and resources, for example, is only permission. Telling team members that they should go ahead and make decisions or solve problems without providing them the skills, training, budget and time to accomplish the task is a prescription for volatile failure.[9]

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[9]Fisher, 14.

DESCRIPTION OF NEXT CENTURY'S MANUFACTURING OPERATIONS[10]

Given the scale and scope of Next Century's rubber product operations, manufacturing processes are simultaneously capital, labor and technology intensive. Although ostensibly continuous in nature, numerous variations in end product composition mandate batch processing.

The manufacture of rubber products begins with the mixing of natural and synthetic rubber as well as chemicals into various compounds using proprietary formulations. The mixing process occurs in banbury mixers as rotating blades disaggregate bulky bales of rubber and feed the material formulations onto and through sizable metal rollers. Movement through the rollers fully integrates the various raw materials into rubber compounds.

Specific rubber compounds proceed through one of two distinct processes, either calendering or extruding, en route to component processing operations. Next Century's FOCUS Small Business Team (SBT) produces treatment through the calendering process. Treatment is fabric or wire sheet impregnated with rubber compound. After impregnating either fabric or wire with rubber, calendering wraps lengthy sheets of treatment onto rolls for further processing.

Component processing operations transform treatment into one of several intermediate products, including belts, plies and reinforcements. Ultimately,

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[10]The author drew information for remaining sections largely from (1) company documentation and (2) interviews, by the author, with company personnel during site visits, 17-22 January and 24-30 March 1993.

various combinations of the intermediate products provide the rigidity and strength characteristics necessary for specific end products.

The fabrication and initial processing of treatment require the integration of materials and processes, in combinations varying with the characteristics of the end product. The primary materials comprising treatment include fabric or wire and rubber compound. The fundamental manufacturing process in the fabrication of treatment is calendering.

Fabrics vary by cord alignment and number of cord ends per inch of fabric sheet width. Fabric selection influences the rigidity and strength characteristics of the intermediate and end products. FOCUS processes several types of fabric.

Plant buying personnel procure fabric primarily from internal, although geographically separate, fabric weaving operations and attempt to maintain minimal inventory balances. Fabric mill rolls, each weighing roughly 2,600 pounds, arrive regularly. Typically, the processing of each fabric mill roll results in several fabric treatment rolls, each exceeding 500' in length.

Customer specifications determine the number of wire ends per inch of treatment sheet width. Such specifications influence the strength characteristics of the resulting belt and, ultimately, end products. FOCUS generally processes one type of wire.

As with fabric, plant buying personnel procure wire, but several external vendors supply wire needs. Again, attempting to maintain minimal inventory balances, vendors deliver wire spools in multispool packages to provide the set

of over 1,000 spools necessary for use in the fabrication of wire treatment. Given the complexity of changeover between fabric and wire processing, fabrication of wire treatment is typically continuous through the length of each wire spool set. Each set generates roughly 50 wire treatment rolls, each exceeding 500' in length.

Specific rubber compounds, or gums, arrive in sheet form on pallets from banbury mixing operations for use within FOCUS. Each pallet generally carries in excess of 2,000 pounds of gum sheet. After further mixing and softening across several sets of metal rollers, the complex calendering process uniformly impregnates either fabric or wire with gum.

Generally transporting material above, below and between several sets of metal rollers, the successful fabrication of treatment requires the precise interaction of:

- letoff and compensating equipment for fabric;
- creeling equipment for wire;
- milling equipment for gum;
- calendering equipment;
- cooling equipment;
- compensating and windup equipment.

Letoff, or loading, equipment unwinds fabric from fabric mill rolls and maintains system tension. Additionally, letoff equipment allows the exchange of fabric mill roll shells for fabric mill rolls as well as the splicing of fabric. Immediately before exchanging shells for rolls, the first set of compensating equipment increases the distance between several pairs of metal rollers by several feet and festoons, or hangs, sufficient fabric for continuous calender

operation. While exchanging and splicing, the compensating equipment decreases the distance between the metal rollers and, thereby, supplies fabric to the calender equipment. Creeling equipment, consisting of eyelet sets, combs as well as several guide and impression rollers, supplies wire in one continuous sheet to the calender equipment.

Milling equipment uses several sets of metal rollers to further mix and soften sheets of gum before supplying appropriate quantities of gum to the calender equipment. In extremely simple terms, calendering equipment employs pairs of adjustable metal rollers and sophisticated gauging technology to impregnate, through pressure, fabric or wire sheet with specific quantities of gum. Cooling equipment, essentially several metal rollers refreshed with chilled water, slows the curing of the gum in treatment and thereby allows further processing.

Immediately before exchanging treatment rolls for treatment roll shells, the second set of compensating equipment decreases the distance between several pairs of metal rollers by several feet. The decrease allows the festooning of treatment, during the exchange, in sufficient quantity for continuous calender operation. While exchanging rolls for shells, the compensating equipment increases the distance between the metal rollers and, thereby, accommodates fabric emerging from the calender equipment. Windup equipment winds treatment onto fabric or wire treatment roll shells, maintains system tension and allows the exchange of treatment rolls for treatment roll shells.

Despite the technical sophistication of calendering equipment, several production floor employees, known generally as Associates, must act interdependently to ensure the successful fabrication of treatment. During

calender operation, Associates assume specific positions which vary with the type of treatment in process: Letoff Operator, Creeler, Mill Tender, Calender Operator, Windup Operator, Windup Trucker and Relief Operator.

As necessary, calendering involves General Operators and Maintenance Technicians. General Operators are Associates with experience and training in all calendering and other processes. Maintenance Technicians perform both failure and preventive maintenance activities.

Calender Letoff Operators are responsible to:

- identify fabrics and specific mill rolls for processing within 24 hours;
- letoff, or load, fabric mill rolls onto the calender equipment for processing;
- initiate changeovers to fabric by splicing the calender lead liner with fabric;
- exchange fabric mill roll shells for fabric mill rolls as well as splice fabric from one roll to the next;
- bundle the reusable cardboard covers protecting unused fabric mill rolls and clean fabric mill roll shells for return shipment to fabric weaving operations;
- perform calender letoff and fabric irregularity reporting;
- conduct routine housekeeping activities;
- assist Mill Tenders or Calender Windup Operators as necessary.

Creelers are responsible to:

- obtain releases from the wire sample testing staff;
- order and unpack appropriate spools of wire from the raw material automatic storage and retrieval system;
- hang individual spools onto metal racks, each rack providing two sets of nearly 1,000 spindles;

- string wire from each spool, in each set of over 1,000 spools, using fixed patterns through sets of eyelets;
- initiate changeovers to wire by splicing the calender lead liner with wire;
- comb wire and ensure proper wire travel across several rolls and into the calender as sheet throughout processing;
- strip empty spools from racks and package reusable spools for return to vendors;
- perform creel setup and other reporting;
- conduct routine housekeeping activities;
- assist Calender Operators, and other personnel, as necessary.

Mill Tenders are responsible to:

- supply each of several consecutive mills, essentially pairs of metal rollers, with sufficient gum for thorough mixing and softening before calendering;
- reposition mill blades as necessary to supply calender equipment with appropriate quantities of gum;
- conduct routine housekeeping activities;
- assist Calender Letoff Operators as necessary.

Calender Operators are responsible to:

- communicate and coordinate the calendering schedule among involved Associates;
- supply appropriate quantities of gum to the banks of the calender's metal rollers;
- set, monitor and adjust various operating parameters using complex measuring technology to ensure proper interaction of equipment throughout the treatment fabrication process;
- perform calender setup, performance and failure reporting;
- conduct routine housekeeping activities;

- assist Mill Tenders as necessary.

Windup Operators and Windup Truckers share responsibilities to:

- retrieve fabric or wire treatment roll shells and cloth liners, necessary to prevent binding of the tacky treatment sheet, from downstream operations;
- exchange treatment rolls for treatment roll shells;
- transport treatment rolls to specific locations for further processing;
- perform defective cloth liner and finished roll weight reporting;
- conduct routine housekeeping activities;
- assist Mill Tenders as necessary.

Relief Operators are responsible to:

- perform the tasks of any Associate as necessary;
- retrieve appropriate cloth liners from downstream operations;
- transport gum and treatment as necessary to ensure continuous operation;
- gather waste materials from Calender Letoff, Calender Windup and other stations;
- perform waste classification and weight reporting;
- conduct routine housekeeping activities.

After cutting and other fabrication, assembly operations integrate all product components, including derivatives of treatment, through use of complex programmable machinery. Following assembly, uncured product continues to curing presses which simultaneously mold, shape and vulcanize product under heat and pressure. Final finishing, such as product buffing, and inspection for uniformity follow curing. Rigorous inspection processes scrap end products failing to achieve tolerances for appearance, balance and other parameters.

CORPORATE, DIVISION & PLANT ORGANIZATION DEVELOPMENT

The expansion of aggressive production and quality targets in Next Century's complex operating environment is continuously forcing the evolution of corporate, division and plant organization systems. Through experience and experimentation, Next Century's management philosophy is shifting across the continuum, from autocratic policies promoting the control of labor and existing procedure, toward participative programs reinforcing the commitment of labor and continuous improvement.

Initial drivers for organization development arose from at least two trends in the rubber products industry following 1970: increasingly adversarial labor relations and emerging Eurasian competition. Poor labor relations resulted in strikes throughout the industry during 1976. The technological prominence of one European producer's rubber products during the period illustrated the growing strength of international competition and threatened significant reductions in market share for other rubber products manufacturers.

Attempting to reverse the increasingly adversarial relationship with labor for economic and social reasons as well as to initiate employees' contributions to process improvement, Next Century began experimenting with rudimentary notions of participative management. Simultaneously, Next Century announced plans during 1977 to invest funds exceeding $200 million in the construction of rubber products manufacturing facilities in Brayton, ND. Committing to employ leading edge technologies and to avoid traditional autocratic management practices in Brayton, corporate management sought to maximize the profitability of operations and minimize the threat of employee unionization.

After facing numerous implementation obstacles as well as general economic recession, resulting layoffs and growing risk of unionization, Next Century's corporate and division management shifted the commitments of plant management in Brayton from avoidance of autocratic behavior to pursuit of participative action. With assistance from academicians, plant management adopted processes for identifying dissatisfiers, planning changes and effecting transitions. Through such processes, plant management eliminated numerous communications gaps with production employees by:

- establishing explicit open communications policies for all plant employees;
- introducing the archetype of today's highly successful Work Simplification (Work Simp) suggestion program;
- merging maintenance and manufacturing employees into early production teams.

Performance improvements engendered announcements during 1983 dedicating funds to expand the Brayton plant's production capability in excess of 20%. Shortly thereafter, however, gaps in the integration of plant functions became evident. Significant expansion of production scale and scope as well as growth in process complexity rendered adherence to the then prevailing functional organization structure unmanageable.

Executing division directives, plant management weakened Brayton's strict functional organization during 1984 by integrating the plant's functional and production responsibilities within four discrete operating units, known as Business Centers (BC). Clear divisions between BCs responsibilities, occurring at significant pauses in the plant's manufacturing process flow, enforced the dissolution of functional control. By reducing functional control, introduction of

the BC structure eliminated two levels of management, generated cost savings and shifted management attention from functional to process concerns. The operations of the Brayton plant currently support five BCs.

As cumulative capital investment in the Brayton plant grew beyond $400 million, the complexity of massive scale largely consumed the contributions to organization effectiveness of (1) open communications, (2) Work Simp and (3) process focus, despite the productivity of such efforts. While exploring development alternatives to accommodate the plant's 2,250 employees, plant management gained exposure to current research findings in the field of organization design, including theories of high commitment systems and illustrations of production system evolution through the three stages of (1) craft, (2) mass and (3) lean production.

Today, plant management's strategic vision freely blends the findings of various research efforts. The vision promotes growth from the mass production system toward the third stage, lean production system, necessary to implement sustainable continuous improvement programs:

> Small groups of workers would be treated as full partners in the process, responsible for their own work, able to improve and modify their process, and with knowledge of the previous and next stages of production (their internal customers and suppliers) so that they would understand the requirements and effect of their work. Ohno found that these work groups, given the necessary information, worked to continuously improve their work process.[11]

Following selective adaptation of Japanese manufacturing precepts, plant management refers to lean production as Stage III production. The vision

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[11]Lawrence M. Miller, Design for Total Quality (n.p.: Miller Consulting Group, 1991), 7.

underlying the Stage III production system emphasizes the importance of total quality concepts, particularly customer driven operation realized through continuous improvement and emotional attachment. Extrapolating from the findings of Japanese firms, continuous improvement and emotional attachment both derive from the involvement of production employees in the design and execution of tasks.

Throughout transition from the mass production system, plant management presented production employees with increasing involvement in the execution, although not necessarily in the design, of routine plant tasks. Involvement emerged initially through open communications policies and then through problem solving teams. Requiring modest resources for design and implementation, open communications policies and problem solving teams readily provided the benefits typical of work simplification programs. Certainly of value, for example, are the 837 proposals contributed by the employees of the Brayton plant to the formal Work Simp program during 1992.

However, the planning and resource requirements for implementing the Stage III vision vastly exceed the requirements for weakening the disenfranchising effects of the mass production system. Following experimentation with autonomous and semiautonomous work teams, plant management initiated Small Business Team (SBT) development during January of 1991. Development activities resulted in establishment of the first SBT prototype, known as the "QUEST" team, in May 1991.

Establishing QUEST required significant effort. With external guidance, plant management first divided the plant's manufacturing process flow into chunks of

work. Each chunk in the process delimits the boundaries of responsibility for one SBT. After identifying the independence of one component's construction process relative to other plant processes, plant management selected the process for SBT prototyping. Upon the bounding of QUEST's functional responsibilities for component construction, the experiment in self-direction began.

Aspects of QUEST's performance validated the strength of SBT organization for promoting the Stage III vision of total quality through commitment. For example, gains in employee satisfaction during the experiment indicated potential, through SBT organization, for reducing absenteeism and turnover as well as supervisory costs.

Unfortunately, the prototype experienced numerous difficulties. QUEST faltered in generating acceptable production costs and volume. Lack of adequate performance indicators, minimal understanding of administrative and managerial responsibilities on the part of production employees as well as general expectations for immediate success on the part of plant management resulted in excessive experimentation regarding integration of administrative tasks into routine operations and production employee multiskilling.

Despite such difficulties, the experiment offered guides for improvement. Bounding of administrative and managerial responsibilities, development of adequate performance monitoring tools for SBT use and provision of complementary management, as well as team development, training for production employees must precede implementation of SBT organization.

Building upon the insights gained from QUEST's performance, plant management formalized the shift toward SBT organization by:

- obtaining external expertise regarding methods for managing self-directed work teams;
- initiating internal development of basic support and training systems for the managers of SBTs;
- directing significant attention to the design of FOCUS, the first SBT in the current generation of SBTs.

PROGRESS TOWARD SMALL BUSINESS TEAM ORGANIZATION

During the ongoing transition to Small Business Team (SBT) organization, Next Century's division and plant management are focusing developmental resources on training for the managers of SBTs. Within the context of Next Century's operations, SBT Managers serve as the primary liaison between plant management and production employees and thus bear significant responsibility in the process of operationalizing all facets of SBT organization.

Prior to reorganization, today's SBT Managers, previously known as Area Managers, performed the functions of traditional shift supervisors. The duties of Area Managers primarily involved the execution of administrative, not managerial, tasks. For example, the performance evaluation form for Area Managers lists the 147 specific duties of the Area Manager within ten broad categories of performance. Under the category of "Maintaining Quality," Business Center (BC) Managers evaluated Area Managers against fifteen duties:

- take corrective action with subordinates to see that quality is maintained;
- observe work in progress;
- confirm that production is at specification;
- consult with production specialist as needed;
- check with next department for evaluation of own department's output;
- investigate sources of contamination of materials;
- initiate changes in response to Quality Assurance directives;
- inspect raw materials to determine quality;
- consult with Quality Assurance directives;
- read and interpret Quality Assurance reports;

- respond to quality problems based on discussions with superiors;
- assist process control by special marking of product;
- make first product checks on all code, spec, or machine changes;
- use statistical process control;
- read and interpret specifications.[12]

Despite hints of reward for initiating performance improvement, the reward system for Area Managers clearly promoted compliance with management and technical staff initiatives. Although cultural transition is far from complete, the responsibilities of current SBT Managers differ dramatically from the duties of former Area Managers. For example, SBT Managers must develop formal SBT business plans:

- forecasting throughput efficiency and volume;
- identifying opportunities for technical, social and economic improvement;
- proposing the educational and other resources necessary to achieve such performance.

As the plant's cultural transition is incomplete, current SBT business plans largely serve as score cards for tracking throughput. Moreover, internal training materials for SBT Managers primarily serve as templates for standardizing and structuring the activities involved in formally introducing the SBT organization to production employees. Materials are under development to provide SBT Managers with tools and knowledge necessary for transforming SBT business plans into guides for business performance improvement.

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[12]Company documentation.

Current templates, such as the "SBT Manager Certification/Progress Report," detail transition activities. Moreover, the templates emphasize activity reporting to BC management and plant staff. Following SBT introduction, SBT Managers must complete certain activities and report progress within three weeks, three months, six months and as appropriate thereafter. For example, per the Progress Report template, SBT Managers must, "Provide a list of those vertical [administrative] tasks to be transferred to SBT Associates and establish boundaries,"[13] within the second week of transitior

Written in thorough detail and implying expectations for rapid transition, the templates promote transfer of existing tasks, such as the purely administrative duties of former Area Managers. With the progression of time, listed transition activities become increasingly complex, but remain specific in nature. Templates to assist SBT Managers in establishing SBT business plans and training requirements are similarly specific in nature.

By promoting standardization in analytic and reporting activities as well as transfer of existing tasks, the use of templates discourages SBT Managers from developing potentially potent alternative means and methods of obtaining improvement. For example, the process of collaborative task redesign, neither identified nor recommended in current templates, is tailored to gain improvement by capitalizing upon the specific, and often unique, blend of production employees' capabilities and motivations within discrete SBTs.

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[13]Company documentation.

Responding to developmental deficiencies, plant management is strengthening the skills of SBT Managers, particularly regarding participative management. Using the educational materials of external consultants, for example, plant management is exposing SBT Managers to topics including: making group decisions, holding effective meetings, goal setting and measuring results as well as facilitating groups.

However, production employees currently receive minimal, if any, formal training in the technical, social and economic aspects of production. Plant management's ability to successfully implement participative management practices and obtain business performance improvement without actively broadening and expanding the extent of production employees' knowledge regarding technical, social and economic issues remains largely uncertain.

Despite widely varying states of maturity, plant operations now support twenty-eight SBTs, including FOCUS, with the goal of becoming:

> Self-managed work teams that are customer driven, control their own productivity, perform productive maintenance, control cost, drive quality, deliver their product, empowered to make operating decisions, with a system for continuous improvement.[14]

Ideally, blending SBT theory and the nature of operations occurring within Next Century's Brayton plant, SBT personnel would ultimately assume responsibility for numerous activities currently the purview of plant or BC management. Possibilities for development imply growth in the involvement of SBT personnel

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[14]Company documentation.

in designing and executing the operating and administrative as well as the planning and support tasks (EXHIBIT 1) necessary for plant operation:

> Companies get better when employees cooperate on joint tasks. When people meet across levels and lines of status . . ., when problems are seen as systemic rather than discrete, wonderful . . . things happen. . . . Such happenings lead to more creative and committed actions, more secure and engaging work. During the months that a design team works on a plan, its members use what they are learning on the job every day, making small improvements that help the system function better.[15]

In the ideal scenario set out by current literature, for example, SBT personnel would assume all current plant management and BC personnel responsibilities for managing and incrementally improving upon the operating and administrative tasks associated with daily production. Operating tasks include the range of functional, and generally physical, tasks necessary to achieve production. Administrative tasks, often managerial in nature within the current context, range from scheduling SBT staffing and production to reviewing SBT performance and productivity with plant management.

Responsibility for performing operating and administrative tasks would rotate among individual SBT personnel or groupings of personnel within individual SBTs. Through team meetings, SBT personnel, not the SBT Manager, would determine rotation schedules as well as the individual or collaborative nature of decision making for specific tasks. Proper performance of administrative tasks, particularly regarding SBT procurement and distribution functions, would likely require frequent communication between the personnel of several SBTs, possibly

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[15]Marvin R. Weisbord, Productive Workplaces (San Francisco: Jossey-Bass Publishers, 1987), 274.

resulting in the establishment of task coordinating committees with representation from several SBTs.

Beyond the daily operating environment, SBT personnel, perhaps through the use of committees staffed with rotating personnel, would gain participation in major plant planning and support activities. Planning activities are programs to fundamentally alter the technical, social or economic functioning of the plant. The recent development of the Stage III vision by plant management represents one such planning activity. Support activities define and deliver the scope of training, and technical or clerical assistance, necessary to smoothly implement the findings of planning activities.

The participation of SBT personnel in plant planning processes, such as refinement of the Stage III vision, would consist of representation on planning committees, thereby:

- providing plant management and BC personnel with production employees' perspectives, reactions and suggestions regarding potential changes prior to implementation;
- promoting the development and presentation of communications and training programs regarding specific changes in terms relevant to production employees.

Free of operating and administrative responsibilities, both plant management and BC personnel would significantly expand the extent of planning and support tasks currently undertaken, thereby shifting respective responsibilities during transition to SBT organization. Ultimately, BC personnel would interface

directly with plant management regarding the technical implications of change proposals as well as with SBT personnel regarding the development and provision of specific technical, social, and economic training programs.

INDICATIONS & IMPLICATIONS OF FOCUS' DEVELOPMENTAL CONDITION

Today, achievement of FOCUS' production objectives requires support from one Small Business Team (SBT) Manager and over 50 production employees, or Associates to:

- perform calendering and creeling functions;
- perform various proprietary functions;
- relieve other Associates by performing operating functions as necessary during breaks and meetings involving other Associates;
- assist the performance of operating functions, as experienced General Operators;
- perform failure and preventive maintenance functions.

FOCUS receives significant administrative, managerial and technical direction from both Business Center (BC) and plant employees relations personnel. For example, production employees regularly interact with the BC's Shift Coordinators and Production Specialist.

The Shift Coordinators ensure the coordination of daily production requirements among the SBTs operating both within and beyond the boundaries of the BC. The Production Specialist, in conjunction with division and plant technical staff, both implements and supports technological development within the BC. Per plant management mandate, each of the five BCs within the Brayton plant similarly structures direction for the activities of SBTs.

Establishment of FOCUS initiated the implementation of SBT organization throughout the Brayton plant. Study of FOCUS indicates the characteristic

implications involved in introducing and implementing SBT organization. One conclusion arises continuously in observing the pace and strength of FOCUS' development. The extent of development toward SBT organization correlates with the breadth and depth of production employees' knowledge regarding the technical, social and economic aspects of production. The status of FOCUS' transition toward SBT organization corresponds with the limits of Associates' knowledge regarding the:

- technical intricacies and interrelationships of the tasks necessary for fulfilling FOCUS' manufacturing requirements;
- social behaviors, such as collaboration, of effective groups;
- cost and economic factors influencing FOCUS' financial performance.

Technical Aspects of Production

Although theoretical, operational, analytical and integrational knowledge are each necessary in some measure for completing any set of tasks, the extent of demand for each type of knowledge varies considerably with the complexity of the task set at issue. Regarding relatively simple tasks, Associates within FOCUS are improving status quo productivity through the introduction of multiskilling initiatives.

For example, Creelers and Truckers are becoming increasingly interchangeable. Such multiskilling largely illustrates the distribution of operational knowledge concerning the technical aspects of production. By increasing knowledge of FOCUS' production system, the SBT Manager's use of multiskilling is expanding Associates' ability to develop further.

For positions involving complex tasks, such as Calender Operator or Mill Tender, multiskilling initiatives are not under consideration. Declining to distribute the body of knowledge necessary for performing complex tasks mitigates the significance of investments in training but, alternatively, may limit potential for achieving significant performance gains. Although possible for simple tasks, provision of training in procedural issues alone largely fails to enable the pursuit of improvement regarding complex tasks:

> In Taylor's factories workers were truly extensions of machines. Now, machines do physical work better, more precisely, and faster. However, people have to be smarter about using them. Instead of adding energy, factory workers increasingly add intelligence and judgment.[16]

To consider pursuing performance improvement, Associates must possess, or possess adequate access to, theoretical, analytical and integrational knowledge. Theoretical knowledge provides awareness of optimal operating rates for equipment given the processing characteristics of specific gum compounds. Analytical knowledge incorporates the ability, using theoretical and operational knowledge, to establish the magnitude of variance between optimal and current performance as well as the significance of causes contributing to the variance. Integrational knowledge, generally the purview of management or supervisory personnel, contributes the ability to blend specific improvement solutions smoothly into the broad system of existing operations.

The major body of theoretical and analytical knowledge supporting FOCUS' production currently resides in BC staff positions, such as the position of Production Specialist. Within FOCUS, integrational authority and knowledge

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[16]Ibid., 173.

reside in the SBT Manager, assuming support from BC management. Holding knowledge sufficient to maintain status quo production volume given assistance from the SBT Manager, Associates are generally, and in the present context rightly, content with current performance.

Nevertheless, the productivity of the Brayton plant's Work Simp program certainly acknowledges the importance of formal learning and extensive knowledge in generating improvement. However, improvements gained through Work Simp are largely exceptional and occur randomly, while improvements achieved through SBT organization are specifically expected and occur systematically.

Social Aspects of Production

Beyond the technical aspects of production, the depth of Associates' knowledge declines dramatically. Discussion with Associates revealed considerable confusion regarding the social interactions appropriate for individual production employees in SBT organization. For example, Associates foresee minimal requirements for task redesign and thus no responsibility to participate in redesign. However, improvement through production employee involvement in task redesign is one of several success factors implicit in SBT organization:

> In 1900 Taylor had experts solve problems for people -- scientific management. In 1950 Lewin's descendants started everybody solving their own problems -- participative management. About 1965 experts discovered systems thinking and began improving whole systems, *for*

> other people. Now we are learning how to get everybody improving whole systems.[17]

Expansion of knowledge, including awareness of appropriate behaviors, is essential in successful transition to SBT organization. Today, confusion among Associates, largely regarding the nature of appropriate behaviors under SBT organization, is resulting from decline in the articulation, clarity and operability of the Stage III vision as information flows downward from plant management to individual Associates:

> The visioning process can wither if, as more people get involved, the diversity of views dissipates focus and generates unmanageable conflicts. People see different ideal futures. Must those who do not agree immediately with the emerging shared vision change their views? Do they conclude that the vision is "set in stone" and no longer influenceable? Do they feel that their own visions even matter? If the answer to any of these questions is "yes," the enrolling process can grind to a halt with a wave of increasing polarization.[18]

Plant management is responding to Associates' confusion with education for SBT Managers. One Plant Facilitator and six Facilitators, five supporting the BCs and one supporting the technology staff within the plant, are in place. Additionally, the role of Shift Coordinators is transitioning to responsibility for facilitation of SBT organization. Despite the positive impacts of facilitation, education for SBT Managers cannot generate the clarity of understanding gained by either additionally or alternatively involving Associates directly in planning processes.

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[17]Ibid., 261.

[18]Peter M. Senge, The Fifth Discipline (New York: Doubleday. 1990), 227.

Economic Aspects of Production

Regarding the economic aspects of production, Associates within FOCUS are marginally aware of operating costs and analysis methods. Increasingly responsible for initiating performance improvements, Associates must understand the whole system of implications, technical, social and economic, resulting from the implementation of various improvement proposals. Given SBT organization, Associates' ability to discriminate between the value, for example, of undertaking either inventory reduction or waste prevention projects is critical in ensuring the efficient use of plant resources. Currently, cost analysis and industrial engineering personnel maintain budget, cost and variance information regarding SBT performance. Nevertheless, Associates are not aware, for example, of the economic value of scrap from FOCUS' operations.

Without awareness of appropriate social behaviors or financial performance metrics, SBT personnel are currently neither conducting substantive evaluations of support and training requirements nor negotiating the cost and nature of support provided from BCs. Given the current state of transition to SBT organization, the full extent of change necessary regarding BC management and support practices remains appropriately uncertain.

Today, Associates lack regular opportunities for the substantive learning and sharing of knowledge. Nevertheless, systems promoting development of the knowledge sufficient for successful SBT organization are evolving throughout the Brayton plant but require integration into routine SBT operations as well as customization to the specific needs of individual SBTs, including FOCUS.

FOCUS' successes thus far in implementing SBT organization derive largely from harnessing the experiential knowledge of Associates and transferring responsibility for the completion of existing administrative tasks, such as data entry for payroll processing, from BC staff to Associates. By reducing BCs' clerical staffing requirements, savings in personnel costs represent one possible benefit of SBT organization.

However, the significant returns of SBT organization originate from the performance improvements enabled by educating and involving production employees in task redesign. Lacking both authority to undertake substantial task redesign and pressure to generate improvement, FOCUS' success in the context of SBT organization is stagnating. Expansion of production employees' ability and responsibility to participate in the collaborative design and execution of the tasks is necessary to further develop SBT organization.

OPPORTUNITIES FOR IMPROVING SMALL BUSINESS TEAM PERFORMANCE

By broadening opportunities to gain and share knowledge, Small Business Team (SBT) organizations vastly expand the ability of production employees to substantively participate in business performance improvement. However, successful SBT organization results from significant practice:

> Lastly the discipline of team learning, like any discipline, requires practice. Yet, this is exactly what teams in modern organizations lack. Imagine trying to build a great theater ensemble or a great symphony orchestra without rehearsal. Imagine a championship sports team without practice. In fact, the process whereby such teams learn *is* through continual movement between practice and performance, practice, performance, practice again, perform again.[19]

Certainly, the requirement for practice implies the evolution of capabilities during the transition to SBT organization. Moreover, the capabilities all plant employees, both labor and management, should develop in response to changing responsibilities. For example, production employees should expand analytic facility, perhaps through evaluation of information generated through statistical process control. Management personnel should divert attention from resolution of routine operating difficulties to provision of resources for the empowerment of production employees. Despite substantial progress, several opportunities are present for improving the pace of transition to SBT organization in Next Century's Brayton plant.

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[19]Ibid., 238.

Expand Associates' Knowledge through Formal Training

Before empowerment and involvement become possible, Associates must both gain knowledge and practice the application of knowledge. Given such requirements, plant management should support development of modular educational programs for Associates:

> In fact, information not only supports involvement, it causes it. I have seen numerous examples of team members who have been drawn into improving a longstanding work process, for example, simply because they learned that there was a better way or because they found out for the first time how much money the process cost.[20]

Modularity ensures provision of appropriate training when necessary and useful. Linked to the responsibilities of SBTs, disciplines for learning span the technical, social and economic aspects of production. As learning styles vary across individuals, use of several delivery venues, including lecture and simulation, is appropriate for training. Presentation of formal training programs within the context of official SBT meetings may prove useful until Associates gain the knowledge necessary to conduct effective meetings and discuss substantive production issues.

To broaden the distribution of technical understanding throughout the plant, training programs need not describe the entire manufacturing process flow. Through modularity, alignment of program information content and learning needs of Associates within individual SBTs is possible and increases the value of training. For example, Associates within FOCUS may achieve optimal gains in knowledge from thorough technical education regarding the production of

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[20]Fisher, 39.

treatment and cursory description of the rubber product curing process. Production Specialists certainly possess the technical knowledge necessary to develop and conduct such training.

Early in development, standard organizational development training is sufficient to broaden Associates' understanding of the social responsibilities implicit in SBT organization. Facilitators' current use of externally developed materials describing, for example, the behaviors appropriate in the conduct of effective team meetings is certainly appropriate. However, training should extend beyond SBT Managers to include the Associates also participating in team meetings.

To support requirements for initiating the improvement of tasks, Associates should receive minimal education regarding the economics of production. For example, any proposal advocating shifts from the current rate of production should identify and evaluate the financial implications of perhaps altering either inventory balances or scrap losses. Understanding of economic issues, such as the financial implications of plant inventory control methods, may prove useful for Associates in properly evaluating the utility to the organization of potential improvements. The plant's industrial engineering staff is capable of developing and delivering necessary economic training.

Develop Common Vision through Involvement

Lack of involvement on the part of either Associates or BC personnel during design of the Stage III vision for SBT organization is likely the driving cause of confusion, resistance and stagnation in efforts to operationalize the vision:

> I do not wish to have someone else, no matter how educated, well-intentioned, wealthy, or wise, decide unilaterally what is best for me. Unless we are deeply involved in our work, we cannot feel good about ourselves. Unless we work with others toward valued goals, we cannot infuse hope and aspiration into our lives.[21]

One potential activator for learning, and thus SBT organization, is involvement on the part of both Associates and BC personnel, perhaps using committee structure, in refining the design and communication of the Stage III vision. Without advancement toward common vision, success in coordinating the direction of several heterogeneous and semiautonomous SBTs is unlikely:

> The fundamental characteristic of the relatively unaligned team is wasted energy. Individuals may work extraordinarily hard, but their efforts do not efficiently translate to team effort. By contrast, when a team becomes more aligned, a commonality of direction emerges, and individuals' energies harmonize. There is less wasted energy. In fact a resonance or synergy develops, like the "coherent" light of a laser rather than the incoherent and scattered light of a light bulb. There is commonality of purpose, a shared vision, and understanding of how to complement one another's efforts.[22]

Currently, no Associates participate on the committee formed by plant management to improve communication within the plant. To foster cooperation and learning among Associates, BC staff and plant management, plant managers should display participative behavior consistent with the spirit of SBT organization.

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[21]Weisbord, 378.

[22]Senge, 234.

Render Small Business Team Performance Meaningful

In the ideal scenario, production employees receive the authority, resources and information necessary to transform SBTs into truly responsible organizational entities during the transition to SBT organization. If operations under SBT organization are to become efficient and rational, SBT personnel must also receive full responsibility for accomplishing operating duties and face direct accountability for resulting performance:

> Not sharing accountability is paternalistic and condescending. It sends the message that the empowerment isn't real. Only when all four elements [authority, resources, information and accountability] are present do people feel responsible and act responsibly.[23]

Despite shifts toward SBT organization, plant management continues to perceive the BC as the organizational entity primarily responsible for affecting plant performance. For example, plant management thoroughly reviews aberrations in BC productivity during daily production meetings. Through such evaluation, plant management shields the activities of SBT personnel from direct scrutiny. Moreover, the current placement of responsibility reinforces control behavior on the part of BC personnel, thus promoting continuation of unnecessarily complex communication and decision making processes (EXHIBIT 2).

The current hierarchy of authority and responsibility within the Brayton plant regularly requires involvement on the part of BC management in routine improvement and operating decisions and often results in further participation on the part of plant management. For example, Associates' recent request, justifiable or not, for the purchase of relatively inexpensive radio equipment to

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[23]Fisher, 14.

enable communication while performing outdoor and other responsibilities required the approvals of FOCUS' SBT Manager, BC Manager and, had the project received approval from the BC Manager, possibly the Plant Manager.

The communication links necessary for decision making in the current hierarchy promote traditional management practices, discourage SBT development into decisive organizational units and are simply cumbersome. By rendering SBTs both capable through knowledge and responsible for performance, the opportunity to rationalize the decision making process is significant. As the organizational unit of measure, the SBT, and not necessarily the SBT Manager, would assume routine decision making authority and bear full responsibility for all actions taken, thereby freeing the SBT Manager, BC personnel and plant management to pursue expanded planning and support activities.

Not yet subject to the direct scrutiny of plant management, SBT personnel are marginally aware of performance deficiencies and face few motivations to pursue major improvements. With accountability, Associates would become galvanized to undertake substantive action and thus direct efforts toward SBT development activities, such as improving the effectiveness of SBT meetings.

Transform Business Centers into Support & Training Organizations

As the BC no longer represents the appropriate organizational unit for performance measurement, the role of BC personnel should change from direction of operating personnel to development and maintenance of SBT organization. The range of support activities fitting for BC personnel under SBT organization is broad and may include:

- completion of purely clerical tasks, such as entry of payroll data, which distract costly production employees from value adding SBT development and performance improvement activities;
- provision of highly technical assistance, such as improvement of the current production scheduling software's simulation capabilities;
- development of specific training programs, such as illustration of methods for interpreting statistical process control analyses from scanning equipment.

By removing BC personnel from involvement with and responsibility for daily activities, the transformation would eliminate (1) support from BC personnel for the use of controlling and inefficient decision making processes in the context of SBT management as well as (2) the ability of SBT personnel to cloud SBT accountability by claiming the BC as the primary operating unit of measure.

Shift Focus of Plans from Identification of Ends to Evaluation of Means

The existence of business planning responsibilities for employees of the Brayton plant offers opportunities to identify and evaluate means for quickening the pace of transition to SBT organization. Today, the business plans of Associates and SBTs serve largely as quantitative productivity score cards.

Given requirements for changing methods and responsibilities during the transition to SBT organization, Associates should participate fully in the SBT planning process to (1) expand understanding of immediate technical, social and economic challenges and (2) facilitate development of common vision. Ultimately, business plans should come to provide Associates with knowledge derived from qualitative and quantitative evaluation of the actions, resources and training necessary for improving upon prior performance.

CONCLUSION

Despite learning from both QUEST and FOCUS, the persistence of several concerns argues for further consideration of knowledge's role in Small Business Team (SBT) organization. Business Center (BC) personnel continue to establish, and assume responsibility regarding, the performance goals and metrics for FOCUS as well as the distribution of activities involving FOCUS. The specific resources available to the Associates and Manager of FOCUS for developing effective team operation skills are evolving but incomplete. The scale and scope of knowledge currently present within FOCUS personnel limits Associates' ability to generate continuous improvement in the manufacture of treatment.

However, management practice within Next Century's Brayton plant is progressing toward SBT organization. Improvements in the accountability and credibility of SBTs must occur to successfully complete the transition. The achievement of such improvements necessitates the education and involvement of all employees in the technical, social and economic aspects of production. With appropriate expansion and redistribution of knowledge, effective change from traditional to participative management becomes possible.

Knowledge is necessary to execute any task regardless of organization form. To ensure success in transition to participative management systems, firms must expand production employees' share of theoretical, operational, analytical and integrational knowledge while simultaneously increasing the breadth and depth of channels available to production employees for the application of knowledge.

EXHIBIT 1

Shifting Responsibilities

through Transition to Small Business Team Organization

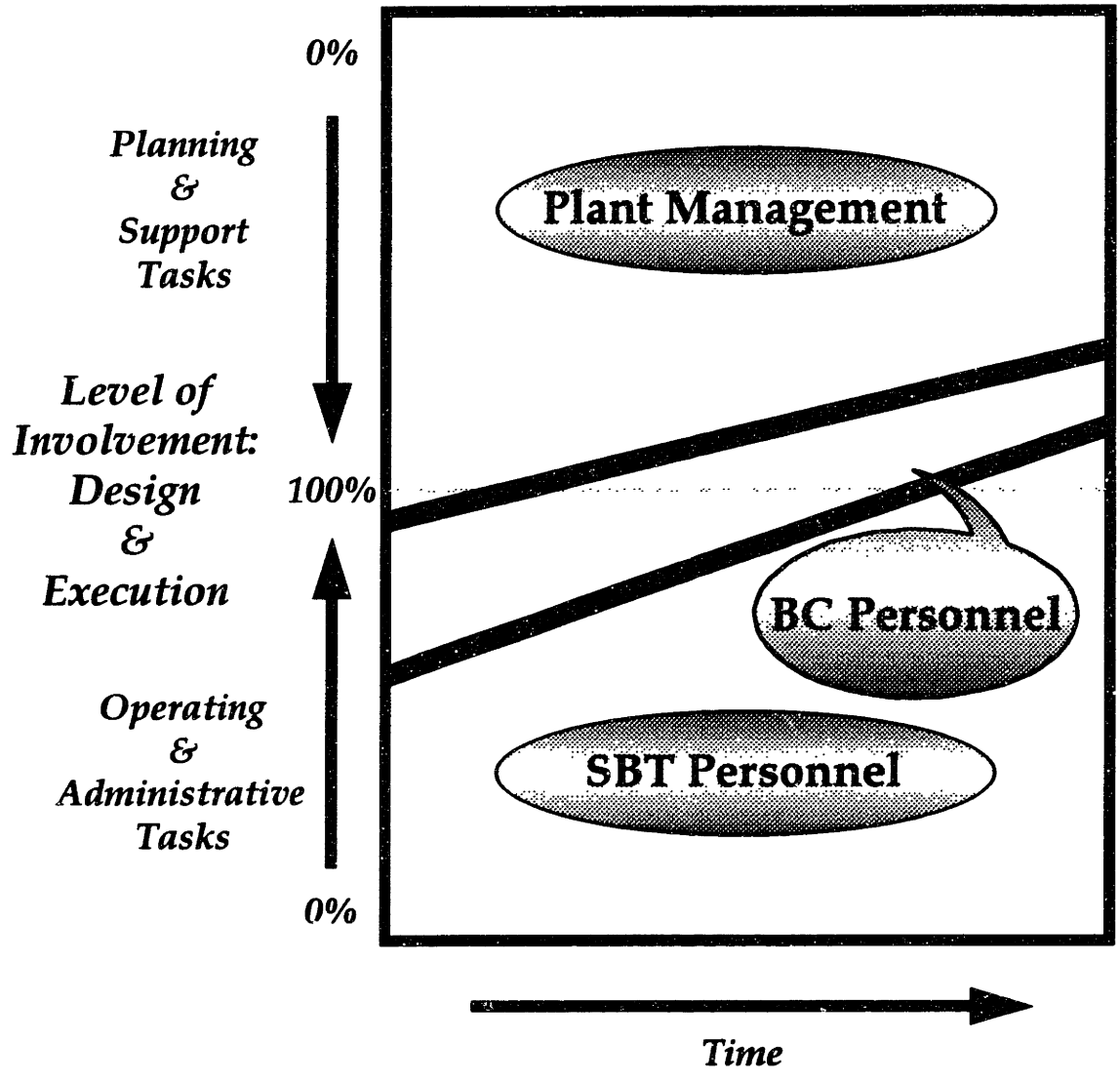
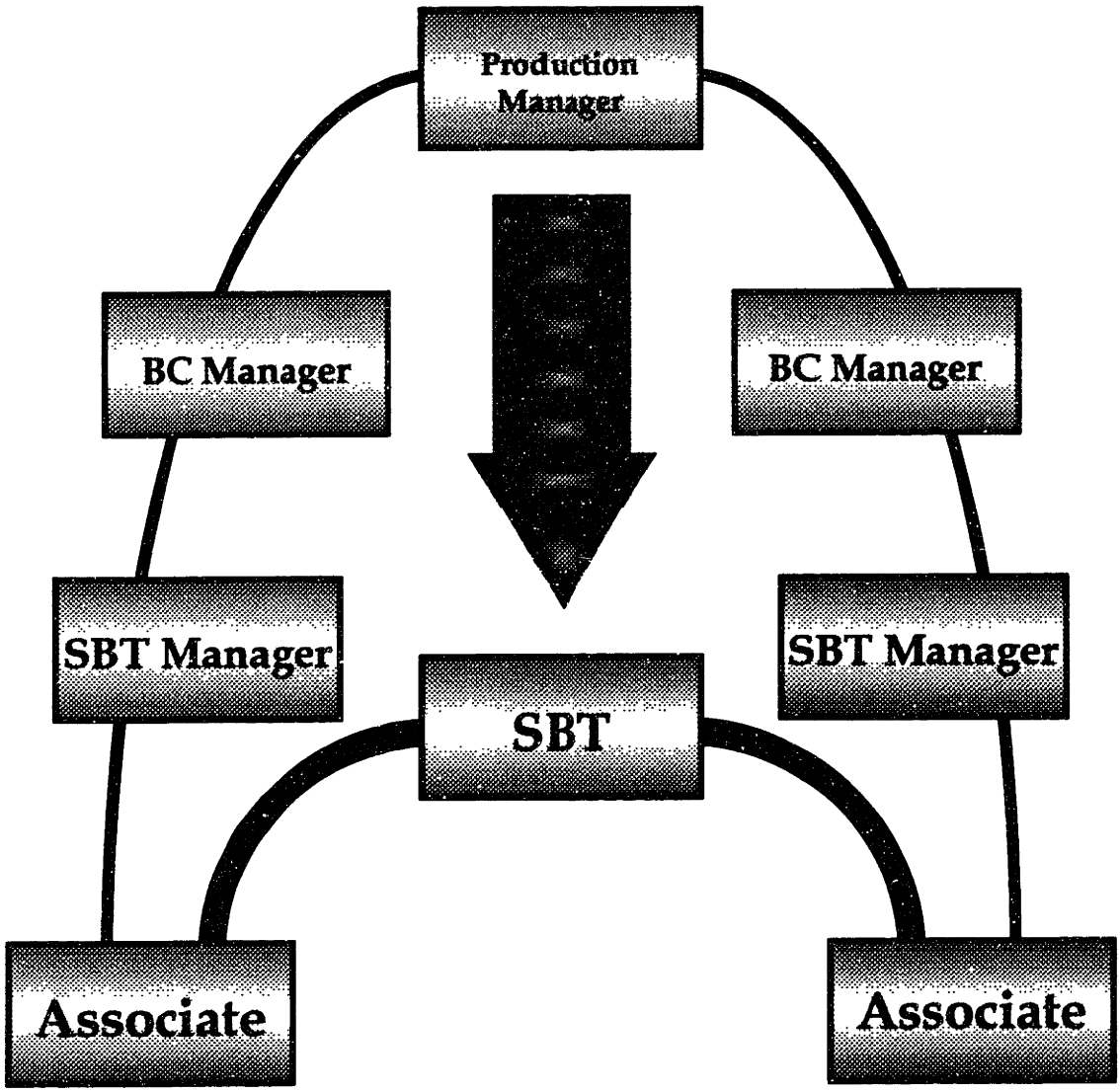


EXHIBIT 2[24]

Improving Decision Efficiency

through Transition to Small Business Team Organization



[24]Chart, with significant modification by the author, adapted from company documentation.

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