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SWOT ANALYSIS

Organizational strategies are the means through which companies accomplish their missions and goals. Successful strategies address four elements of the setting within which the company operates: (1) the company's strengths, (2) its weaknesses, (3) the opportunities in its competitive environment, and (4) the threats in its competitive environment. This set of four elements—strengths, weaknesses, opportunities, and threats—when used by a firm to gain competitive advantage, is often referred to as a SWOT analysis. SWOT was developed by Ken Andrews in the early 1970s. An assessment of strengths and weaknesses occurs as a part of organizational analysis; that is, it is an audit of the company's internal workings, which are relatively easier to control than outside factors. Conversely, examining opportunities and threats is a part of environmental analysis—the company must look outside of the organization to determine opportunities and threats, over which it has lesser control.

Andrews's original conception of the strategy model that preceded the SWOT asked four basic questions about a company and its environment: (1) What can we do? (2) What do we want to do? (3) What might we do? and (4) What do others expect us to do?

The answers to these questions provide the input for an effective strategic management process. While Andrews' original conception of this analysis has been developed and changed to the more streamlined SWOT analysis that we know today, his work is the foundation of this activity.

STRENGTHS, WEAKNESSES, OPPORTUNITIES, AND THREATS

Strengths, in the SWOT analysis, are a company's capabilities and resources that allow it to engage in activities to generate economic value and perhaps competitive advantage. A company's strengths may be in its ability to create unique products, to provide high-level customer service, or to have a presence in multiple retail markets. Strengths may also be things such as the company's culture, its staffing and training, or the quality of its managers. Whatever capability a company has can be regarded as strength.

A company's weaknesses are a lack of resources or capabilities that can prevent it from generating economic value or gaining a competitive advantage if used to enact the company's strategy. There are many examples of organizational weaknesses. For example, a firm may have a large, bureaucratic structure that limits its ability to compete with smaller, more dynamic companies. Another weakness may occur if a company has higher labor costs than a competitor who can have similar productivity from a lower labor cost. The characteristics of an organization that can be strength, as listed above, can also be a weakness if the company does not do them well.

Opportunities provide the organization with a chance to improve its performance and its competitive advantage. Some opportunities may be anticipated, others arise unexpectedly. Opportunities may arise when there are niches for new products or services, or when these products and services can be offered at different times and in different locations. For instance, the increased use of the Internet has provided numerous opportunities for companies to expand their product sales.

Threats can be an individual, group, or organization outside the company that aims to reduce the level of the company's performance. Every company faces threats in its environment. Often the more successful companies have stronger threats, because there is a desire on the part of other companies to take some of that success for their own. Threats may come from new products or services from other companies that aim to take away a company's competitive advantage. Threats may also come from government regulation or even consumer groups.

A strong company strategy that shows how to gain competitive advantage should address all four elements of the SWOT analysis. It should help the organization determine how to use its strengths to take advantage of opportunities and neutralize threats. Finally, a strong strategy should help an organization avoid or fix its weaknesses. If a company can develop a strategy that makes use of the information from SWOT analysis, it is more likely to have high levels of performance.

Nearly every company can benefit from SWOT analysis. Larger organizations may have strategic-planning procedures in place that incorporate SWOT analysis, but smaller firms, particularly entrepreneurial firms may have to start the analysis from scratch. Additionally, depending on the size or the degree of diversification of the company, it may be necessary to conduct more than one SWOT analysis. If the company has a wide variety of products and services, particularly if it operates in different markets, one SWOT analysis will not capture all of the relevant strengths, weaknesses, opportunities, and threats that exist across the span of the company's operations.

LIMITATIONS OF SWOT ANALYSIS

One major problem with the SWOT analysis is that while it emphasizes the importance of the four elements associated with the organizational and environmental analysis, it does not address how the company can identify the elements for their own company. Many organizational executives may not be able to determine

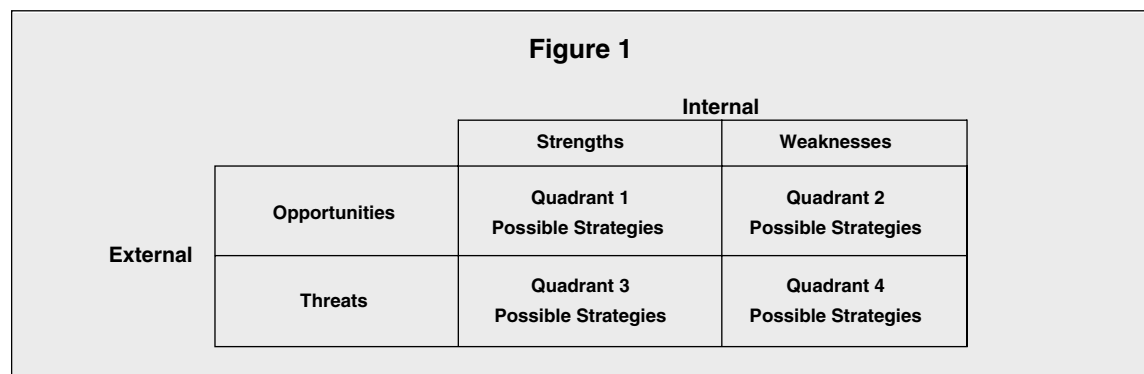
what these elements are, and the SWOT framework provides no guidance. For example, what if a strength identified by the company is not truly a strength? While a company might believe its customer service is strong, they may be unaware of problems with employees or the capabilities of other companies to provide a higher level of customer service. Weaknesses are often easier to determine, but typically after it is too late to create a new strategy to offset them. A company may also have difficulty identifying opportunities. Depending on the organization, what may seem like an opportunity to some, may appear to be a threat to others. Opportunities may be easy to overlook or may be identified long after they can be exploited. Similarly, a company may have difficulty anticipating possible threats in order to effectively avoid them.

While the SWOT framework does not provide managers with the guidance to identify strengths, weaknesses, opportunities, and threats, it does tell managers what questions to ask during the strategy development process, even if it does not provide the answers. Managers know to ask and to determine a strategy that will take advantage of a company's strengths, minimize its weaknesses, exploit opportunities, or neutralize threats.

Some experts argue that making strategic choices for the firm is less important than asking the right questions in choosing the strategy. A company may mistakenly solve a problem by providing the correct answer to the wrong question.

USING SWOT ANALYSIS TO DEVELOP ORGANIZATIONAL STRATEGY

SWOT analysis is just the first step in developing and implementing an effective organizational strategy. After a thorough SWOT analysis, the next step is to rank the strengths, weaknesses, opportunities, and threats and to document the criteria for ranking. The company must then determine its strategic fit given its internal capabilities and external environment in a two-by-two grid (see Figure 1). This fit, as determined



in the grid, will indicate what strategic changes need to be made. The quadrants in this grid are as follows:

- *Quadrant 1*—internal strengths matched with external opportunities;
- *Quadrant 2*—internal weaknesses relative to external opportunities;
- *Quadrant 3*—internal strengths matched with external threats; and
- *Quadrant 4*—internal weaknesses relative to external threats.

Quadrant 1 lists the strategies associated with a match between the company's strengths and its perceived external opportunities. It represents the best fit between the company's resources and the options available in the external market. A strategy from this quadrant would be to protect the company's strengths by shoring up resources and extending competitive advantage. If a strategy in this quadrant can additionally bolster weaknesses in other areas, such as in *Quadrant 2*, this would be advantageous.

Quadrant 2 lists the strategies associated with a match between the company's weaknesses with external opportunities. Strategies in this quadrant would address the choice of either improving upon weaknesses to turn them into strengths, or allowing competitors to take advantage of opportunities in the marketplace.

Quadrant 3 matches the company's strengths and external threats. Strategies in this quadrant may aim to transform external threats into opportunities by changing the company's competitive position through use of its resources or strengths. Another strategic option in this quadrant is for the company to maintain a defensive strategy to focus on more promising opportunities in other quadrants.

Quadrant 4 matches a company's weaknesses and the threats in the environment. These are the worst possible scenarios for an organization. However, because of the competitive nature of the marketplace, any company is likely to have information in this quadrant. Strategies in this quadrant may involve using resources in other quadrants to exploit opportunities to the point that other threats are minimized. Additionally, some issues may be moved out of this quadrant by otherwise neutralizing the threat or by bolstering a perceived weakness.

Once a strategy is decided on in each quadrant for the issues facing the company, these strategies require frequent monitoring and periodic updates. An organization is best served by proactively determining strategies to address issues before they become crises.

An example of how a firm can develop strategies using these quadrants is as follows. Generic Corporation produces high-quality, high-priced specialty kitchen items in a catalog and in stores and is known for their

excellent customer service. This strength has been able to offset its major weaknesses, which are having few stores and no current capabilities for Internet sales. Its major opportunities come from the explosion of Internet shopping, and its threats are other more high-profile competitors, operating primarily on the Internet, and the concerns of identity theft in Internet sales that many customers have. Matching Generic's strengths to its opportunities (*Quadrant 1*), the firm may choose to enhance its Internet site to allow online purchases, still providing its excellent 24-hour telephone customer service. Ideally, this strategy will offset the weakness of not having an Internet presence, which addresses the concerns of *Quadrant 2*. Additionally, by bolstering the strength of excellent customer service by applying it to the online shopping site, the company may be able to alleviate customer concerns about identity theft (*Quadrant 3*). A strategy for *Quadrant 4*, which matches the company's weaknesses and threats, is that Generic may consider selling its online business to a competitor. Certainly, the *Quadrant 4* strategy is the least preferred, but a proactive strategy that plans for managing such a situation is favored over a crisis situation in which the company is forced to sell with no planning.

A SWOT analysis is a first, but critical, step in developing an organizational strategy. By examining the company's internal capabilities—its strengths and weaknesses and its external environment—opportunities and threats, it helps to create strategies that can proactively contend with organizational challenges.

SEE ALSO: Strategic Planning Tools; Strategy Formulation

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SAFETY IN THE WORKPLACE

One of the biggest issues facing employers today is the safety of their employees. Workplace accidents are increasingly common. In 2003, for instance, the Bureau of Labor Statistics (BLS) reported a total of

4.4 million nonfatal workplace injuries in private industries. Organizations have a moral responsibility to ensure the safety and well-being of their members. Organizational practices that promote safety can also help a company establish competitive advantage by reducing costs and complying with safety laws.

Workplace safety can be quite expensive. Unintentional injuries alone cost more than \$146.6 billion per year for medical and insurance costs, workers' compensation, survivor benefits, lost wages, damaged equipment and materials, production delays, other workers' time losses, selection and training costs for replacement workers, and accident reporting.

State and federal governments strictly regulate organizational safety practices. The government views safety violations very seriously, and the penalties for violating safety laws can be quite severe. In addition to being issued large fines, employers who violate safety regulations can be held liable for criminal charges. The following examples illustrate the types of penalties associated with such violations:

- In November of 2004, OSHA fined General Motors (GM) Powertrain plant in Massena, NY for six serious safety violations, including an obstructed exit route, inadequate guarding of moving machine parts, and the failure to assess the need for personal protective equipment for workers. There were additional fines for recordkeeping violations, specifically underreporting injuries and illnesses. The penalty was \$160,000.
- In September of 2004, a Weyerhaeuser plant in West Virginia was cited for improper reporting of injuries and illnesses to OSHA. The fine was \$77,000 and the company had nine months to undergo an independent audit of their recordkeeping practices.
- In July of 2004, OSHA issued a proposed fine against Fru-Con Construction Corp in the amount of \$280,000 for the company's negligence which resulted in the deaths of four employees. An improperly secured 2 million pound, 315 foot long launching truss collapsed, killing the four employees.

GOVERNMENT REGULATION OF SAFETY PRACTICES AT THE WORKPLACE

Federal laws regulate the safety practices of most organizations. We limit our discussion to laws that affect a majority of organizations, but note that several additional laws exist which cover particular segments of the workforce. For instance, numerous laws pertain to government contractors, to specific states, and to

specific industries (e.g., transportation, nuclear power, food, and drug).

The Occupational Safety and Health Act of 1970 is probably the most comprehensive and wide-ranging legislation in this area. It applies to nearly all U.S. workplaces. The act aims to ensure safe working conditions for every American worker by:

1. Setting and enforcing workplace safety standards;
2. Promoting employer-sponsored educational programs that foster safety and health; and
3. Requiring employers to keep records regarding job-related safety and health matters.

Three separate agencies were created by the act:

1. The Occupational Safety and Health Administration (OSHA) develop and enforce health and safety standards.
2. The Occupational Safety and Health Review Commission hear appeals from employers who wish to contest OSHA rulings.
3. The National Institute for Occupational Safety and Health conducts health and safety research to suggest new standards and update previous ones.

The following discussion focuses on the safety standards imposed by OSHA and how they are enforced. OSHA has issued literally thousands of safety and health standards. Areas of basic concern include fire safety, personal protection equipment, electrical safety, basic housekeeping, and machine guards. Each standard specifies such things as permissible exposure limit, monitoring requirements, methods of compliance, personal protective equipment, hygiene facilities, training, and record-keeping.

To comply with these standards, most mid- to large-sized organizations employ safety professionals to keep up with them and ensure that each is being met. These professionals face too many specific issues to mention here, but some of the most important issues they must address appear in Figure 1.

Figure 1 OSHA – Employee Responsibilities

- Read the OSHA poster at the jobsite.
- Comply with all applicable OSHA standards.
- Follow all lawful employer safety and health rules and regulations, and wear or use prescribed protective equipment while working.
- Report hazardous conditions to the supervisor.
- Report any job-related injury or illness to the employer, and seek treatment promptly.
- Exercise rights under the Act in a responsible manner.

Companies with more than ten employees are subject to routine OSHA inspections. Companies with fewer than ten employees are exempt from such inspections, but can be investigated if a safety-related problem is brought to the attention of OSHA. High-hazard industries, such as manufacturing firms, chemical companies, and construction companies, are subject to inspections regardless of the number of employees.

OSHA conducts inspections based on the following priority classifications, which are listed in order of importance:

1. *Imminent danger.* OSHA gives top priority to workplace situations that present an “imminent danger” of death or serious injury to employees. The company must take immediate corrective action.
2. *Fatality or catastrophe investigations.* The second highest priority is given to sites that have experienced an accident that has caused at least one employee to die or three or more to be hospitalized. Employers must report these events within 8 hours. The inspection aims to determine the cause of the accident and whether any violation of OSHA standards contributed to it.
3. *Employee complaint investigations.* OSHA responds third to employee complaints about hazards or violations. The speed with which OSHA responds depends on the seriousness of the complaint. Employees may request to remain anonymous.
4. *Referrals from other sources.* Consideration is given to referrals of hazard information from federal, state and local agencies, individuals, organizations, and the media.
5. *Follow-ups.* OSHA sometimes will return to verify that violations have been corrected.
6. *General programmed inspections.* OSHA will also inspect an organization if it is a high-hazard industry or has a lost workday injury rate that is above the national norm for that industry.

When an OSHA inspection reveals that an employer has violated one of its standards, it issues a citation. The citation, posted near the site of the violation, lists the nature of the violation, the abatement period (i.e., the time frame within which the company must rectify the problem), and any penalty levied against the employer. Willful violations (i.e., those that an employer intentionally and knowingly commits) carry a penalty of up to \$70,000 for each offense. If a death occurs because of a willful violation, the employer may be both fined and imprisoned.

Congress enacted the Hazard Communication Standard (more commonly referred to as the Employee Right-to-Know Law) in 1984. This law gives workers the right to know what hazardous substances they are dealing with on the job. A substance is considered hazardous if exposure to it can lead to acute or chronic health problems. Federal and state agencies have compiled lists of more than 1,000 substances deemed hazardous under this law. The law requires all organizations to (1) develop a system for inventorying hazardous substances, (2) label the containers of these substances, and (3) provide employees with needed information and training to handle and store these substances safely.

Employers typically violate the OSHA Hazard Communication Standard more frequently than any other OSHA standard. The majority of companies are cited for failing to have:

- written hazard communication programs
- an up-to-date hazardous chemical inventory list
- properly labeled chemical containers
- material safety data at the work site, in the form of material safety data sheets (MSDS)
- training programs for teaching employees about the chemicals they work with

Government fines for right-to-know violations may be as high as \$1000 per chemical for first violations and \$10,000 per chemical for second violations. Additional penalties for environmental crimes include fines up to \$75,000 per day and imprisonment.

Another law affecting organizational safety and health practices is the Americans with Disabilities Act (ADA). An individual is protected by the ADA if he or she is disabled, that is, if the individual has a physical or mental impairment that substantially limits one or more of the individual’s major life activities. According to the ADA regulations, temporary, non-chronic impairments that are short in duration and have little or no long-term impact are usually not considered disabilities under the act. For example, broken limbs, sprains, concussions, appendicitis, or influenza are not disabilities. However, if a broken leg did not heal properly and resulted in permanent impairment that significantly restricted walking or other major life activities, it could then be considered a disability.

In 2004, there were 15,376 total charges filed as ADA violations with the Equal Employment Opportunity Commission (EEOC). From July 1992 (when the law first took effect) through the end of September 2004, employees filed 204,997 complaints with the EEOC. Employees who became disabled as the result of workplace conditions or injuries filed about half of these charges. Individuals with back

impairments have lodged the greatest number of charges. People also frequently claimed emotional, neurological, and extremity impairments.

Penalties for ADA violations may be as high as \$50,000 for initial violations and up to \$100,000 for each subsequent violation. In addition, the Civil Rights Act of 1991 allows claimants to collect up to \$300,000 in punitive damages for “willful” violations.

ACCIDENTS AND ACCIDENT PREVENTION

Despite laws designed to ensure safety at the workplace, U.S. companies’ accident rates are alarmingly high. According to one estimate, employees lost eighty million workdays in 2002 from workplace injuries, and more than 3.7 million people suffered disabling injuries on the job that year.

What causes all of these industrial injuries? These causes can be divided into three categories: employee error, equipment insufficiency, and procedure insufficiency. Examples of causes falling within each category are listed here:

- Employee error—misjudged situations; distractions by others; neuromuscular malfunctions; inappropriate working positions; and knowingly using defective equipment;
- Equipment insufficiency—use of inappropriate equipment; safety devices being removed or inoperative; and the lack of such things as engineering controls, respiratory protection, and protective clothing;
- Procedure insufficiency—failure of procedure for eliciting warning of hazard; inappropriate procedure for handling materials; failure to lock out or tag out; and a lack of written work procedures.

Workplace accidents pose serious problems for employees and for a firm’s competitive advantage, but employers can prevent most of them. Many preventive strategies work.

Some people just seem to be accident prone. If some people do have inherent tendencies toward accidents, then organizations should be able to lower their accident rates by screening out accident-prone applicants. Research studies have discovered that individuals with certain personality characteristics are more likely than others to be involved in industrial accidents. For instance, one study found that people with higher accident rates tend to be impulsive and rebellious, and they tend to blame outside forces, rather than themselves, for their mishaps. Another study identified the following four “high-risk” personality characteristics:

- Risk taking: high risk-takers actually seek out danger rather than trying to minimize or avoid it.
- Impulsiveness: impulsive individuals fail to think through the consequences of their actions.
- Rebelliousness: rebellious individuals tend to break established rules, including safety rules.
- Hostility: hostile individuals tend to lose their tempers easily and thus engage in aggressive acts, such as kicking a jammed machine.

Many organizations now use personality tests to screen out individuals with accident-prone tendencies. For example, some companies use a test (called the Personnel Selection Inventory-Form 3S) to assess applicants’ safety consciousness. One part of the test measures the degree to which individuals perceive a connection between their own behavior and its consequences. As noted earlier, individuals unable to see this connection are at greater risk for accidents.

Employers who provide all new employees with training on safe and proper job procedures experience fewer accidents. Employees should learn how to perform each of their tasks as safely as possible. Training should be very specific, as illustrated in the example that follows. This example covers the procedures to be followed by employees working at a large food manufacturing plant:

- When picking up pans from the conveyor belt, pick up no more than two pans before you place them on the pan rack.
- Stack roll pans no higher than the rear rail of the pan rack.
- When you lift or lower the dough, keep both hands on the dump chain.
- When you pull the dough trough away from the dough mixer, hold both hands on the front rail and not on the rail sides.

While safety training is essential, employees do not always apply what they have learned. Just as many automobile drivers know it is wrong to exceed legal speed limits, but do it anyway, workers may choose to ignore instructions and carry out procedures in their own, unsafe way. One way to mitigate this problem is to implement a safety incentive program. Such programs aim to motivate safe behavior by providing workers with incentives for avoiding accidents. The organization formulates safety goals (usually on a department-wide basis) and rewards employees if these goals are met. For example, a particular department may establish the goal of reducing lost-time accidents by 50 percent over the next three months.

If this goal were to be met, all employees within that department would receive an incentive reward, usually in the form of a cash bonus or merchandise.

Safety incentive programs often work quite well. For example, Willamette Industries implemented a program because it was experiencing an average of thirty accidents per year that caused people to miss work. As a result of the program, the company went 450 days without a lost-time accident.

Two problems often arise with safety incentive programs, however. In some cases, workers get so caught up in trying to win incentive rewards that they conceal their injuries and do not report them. When injuries go unreported, injured workers relinquish their rights to workers' compensation and firms remain unaware of safety problems. Second, workers may continue to perform in an unsafe manner (e.g., take risky shortcuts) because they remain unconvinced that such behavior is likely to result in accidents. Unfortunately, these employees are grievously mistaken; unsafe behaviors are a leading cause of accidents. According to one estimate, for every 100,000 unsafe behaviors there are 10,000 near-miss accidents, 1,000 recordable accidents, 100 lost-time accidents, and 1 fatality.

SAFETY AUDITS

Because employees who "know better" often continue to engage in accident-causing behavior, many employers have redirected their focus from accident prevention to the prevention of unsafe acts that could lead to an accident. To do so, firms conduct safety audits. A safety committee or supervisors who observe employees on the job and correct unsafe behaviors generally conduct such audits.

Each employee should be monitored according to a planned schedule, generally on a weekly basis, as follows:

STEP 1: OBSERVATION. Stop in the work area for a few moments and observe worker's activities, looking for both safe and unsafe practices. Use the following guide:

- Be alert to unsafe practices that the employee corrects immediately upon seeing you enter the area (putting on protective equipment, such as gloves or goggles).
- Note whether appropriate protective clothing is being worn.
- Observe how employees use tools.
- Scrutinize the safety of the work area. For instance, is the floor slippery?
- Determine whether rules, procedures, and operating instructions are being followed.

STEP 2: EMPLOYEE DISCUSSION. These discussions should help employees recognize and correct their unsafe acts. When engaging in them, adhere to the following advice:

- If you spot an unsafe act, be non-confrontational. Point out the violation and ask the worker to state what he or she was doing and what safety-related consequences may arise if such behavior continues. Your goal is to help, not blame. Audits should not result in disciplinary actions unless an individual consistently violates safety rules.
- As you observe your employees, encourage them to discuss any safety concerns they may have and ask them to offer any ideas for safety improvement.
- Commend any good performance that you observe.

STEP 3: RECORDING AND FOLLOW-UP. Findings should be recorded in writing. Pursue any item discussed during the audit that requires follow-up.

Accident investigations determine accident causes so that changes can be made to prevent the future occurrence of similar accidents. "Near misses" should also be investigated so that problems can be corrected before serious accidents occur. Supervisors always play a key role in accident investigations. For minor accidents, investigation may be limited to the supervisor meeting with the injured worker and filing a report. In large-scale investigations, the supervisor is usually part of a team of experts, which may also include an engineer, maintenance supervisor, upper-level manager, and/or safety professional.

Accident investigations should be performed in the following manner. When an accident occurs, the investigator's first responsibility is to ensure the safety of all employees by:

- making sure the injured are cared for and receive medical attention, if necessary;
- guarding against a more dangerous secondary event by removing danger sources and evacuating other personnel from the area if necessary; and
- restricting access to the area so no one else will be harmed, and so the scene will not be disturbed.

You should then begin an investigation to identify both the immediate and underlying causes of the accident. The immediate cause is the event that directly led to the accident, such as a slippery floor, failure to wear safety gear, or failure to follow proper procedures.

Immediate causes, while easily found, are not always very helpful in suggesting how future incidents

of this nature can be avoided. To accomplish this aim, the investigator must discover the underlying cause of the accident. For example, suppose a worker slips and falls on spilled oil. The oil on the floor is the immediate cause of the accident, but you need to know why it was not cleaned up and why a machine was leaking oil in the first place. Poor training, lack of rule enforcement, low safety awareness, poor maintenance, or crowded work areas commonly underlie accidents.

The investigator should ensure the accident scene is kept intact until the investigation is finished, as this will be the only chance to view the scene exactly as it was at the time of the accident. If a camera is available, photographs of the scene should be taken. Nothing related to the incident should be destroyed or discarded. The investigator should inspect the location (e.g., check for chemicals, broken pieces of machinery) and interview injured or affected workers, eyewitnesses, and anyone else who may be familiar with the accident area. Interviews should be conducted immediately, while the incident is still fresh in everyone's mind. Individuals should give their own account of the incident; by letting them tell their stories without interruption, the investigator can determine if the various responses corroborate one another. Continue asking why until the underlying causes surface. Once the causes are identified, the investigator should recommend any changes indicated by the findings.

Safety committees often oversee organizations' safety functions. Consisting of both management and non-management personnel, committees perform the following tasks:

1. Assist with inspections and accident investigations.
2. Conduct safety meetings.
3. Answer workers' questions about safety programs.
4. Bring workers' safety concerns to management's attention.
5. Help develop safety incentive programs.
6. Develop ideas to improve workplace safety.
7. Prepare evacuation plans.
8. Prepare procedures for disasters such as tornadoes, hurricanes, etc. and contingency plans following the disaster.

Safety in the workplace works most effectively with a combination of employer attentiveness and employee responsibility. Costs, both financial and physical, can be decreased and injuries reduced with proper training, employer involvement and company-wide adherence to OSHA rules and guidelines. Ensuring safety is important for not only each individual company and worksite, but for industries and national concerns as well.

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SALES MANAGEMENT

In today's global marketplace, managers face many challenges related to fulfilling the customer's ever-changing needs and expectations. The concept of customer service has recently become more complex as a result of globalization of goods and services. Customers are now well-informed decision makers as a result of the abundance of information that is available online and in the media. In addition, today's consumer is most concerned with how a salesperson can solve basic problems and ultimately add value to a product or service. The role of sales intermediaries is now, more than ever, important to success in this new competitive global marketplace. As a result, sales managers have a new challenge of responding to this new environment with innovative techniques for managing and motivating the sales force. The following sections define general sales management terms, examine the role of a sales manager, and focus on methods used to manage, lead and motivate employees.

SALES MANAGEMENT DEFINED

Sales management can be most easily defined as planning, implementing, and controlling personal contact programs designed to achieve the sales and

profit objectives of the firm. Overall, sales managers are responsible for directing the firm's sales program. In carrying out this objective, a sales manager assigns territories, sets goals, and establishes training programs. In addition to setting individual goals, sales managers monitor the performance of their salespeople and continually offer direction and leadership on ways to improve their performance.

The organizational structure for sales management varies depending on the firm's size and strategy. In field sales management, the structure consists of the unit manager, district manager, regional manager, general manager and vice president of sales. The unit manager is often referred to as the manager-in-training with interaction taking place at the customer level. Key responsibilities for the unit manager include training new salespeople, recruiting, selling to small accounts, and running district meetings. District managers, a step up from unit managers, have 5 to 10 years of management experience and generally manage 8 to 10 salespeople. District managers typically report to the regional manager, who is responsible for managing multiple districts in a given geographic area. The general manager is sometimes referred to the vice president of sales and marketing. This position is traditionally at the top of the sales organizational chart, with the VP of Marketing and Sales driving the sales strategy of the firm.

There are distinct differences in bottom and top-level managers. The main difference is the amount of time they spend on each of their tasks. Lower-level managers spend the majority of their time on staffing, directing and monitoring salespeople. Top-level managers generally focus on planning, organizing and coordinating their sales strategy with overall corporate objectives. They also forecast sales, set objectives, develop strategies and policies, and establish budgets.

SALES MANAGEMENT STRATEGIES

Sales managers are confronted with several challenges when designing an effective sales strategy. How should a sales force be structured? How large a sales force is needed? What methods should the sales force use to deliver their message? Strategies vary based on the number of products that the firm offers and if the firm sells to one particular type of customer versus selling to many different types of customers.

When selling one product line to a single industry, with customers in many locations, a territorial sales strategy is used. With this strategy, a sales manager will assign sales representatives to exclusive territories in a given region. These representatives will sell full product lines consisting of multiple products to customers in that territory. A good example of this strategy is food equipment sales. A sales representative for a commercial food equipment company will

typically promote the companies full line of products when selling to restaurants, schools, and cafeterias in their defined territory.

A product sales force strategy is often used when a firm sells along product lines. Using this strategy, a sales manager will require their representatives to focus on selling a single product or small select group of products. This strategy is used by managers when products are numerous and complex. This strategy is widely used in healthcare sales where a salesperson focuses on selling doctors and healthcare providers specific products that are integral to their specialized area of medicine.

Finally, sales managers may use a customer focused sales force strategy where salespeople specialize in matching target customers to specific products or services. This strategy helps a company to concentrate more on building strong, long-term relationships with key customers.

MOTIVATING THE SALES FORCE

A topic of particular interest in sales management is motivation. Motivation is quite possibly the most important aspect of sales management. If a sales force is properly screened, selected and trained, and the product is right, then motivation becomes critical for success. There are many reasons why motivating a sales force is an important part of the sales process. First, salespeople must cope with acceptance and rejection on a continual basis. They go from being exhilarated as the result of a big sale to the disappointment that results from being turned down. Often, salespeople will spend many hours on the road, away from their families, which may affect their overall morale. This, paired with the fact that salespeople usually operate without managerial supervision, indicates that these individuals require a high level of self motivation in order to consistently produce good results. And finally, motivation directly influences the level of enthusiasm a salesperson has in presenting the product or service to the customer. If a sales representative is passionate and enthusiastic about a product or service, it can directly influence the customer's decision to purchase, as well as building strong relationships for future purchases. With that said, it is important to note that sales managers are responsible for instilling and maintaining an effective level of motivation in their staff. In addition to providing strong leadership, a sales manager must motivate a sales force in order to achieve pre-determined sales goals.

Managers can use a variety of tools to successfully motivate their sales force. The most powerful motivator is a well-designed compensation package. Sales managers can effectively motivate salespeople by designing a compensation formula that is a good balance of salary, bonuses, and commissions. Managers

define selling objectives in the form of quotas, established compensation levels, and an effective incentive portion. There are a variety of formulas for compensating salespeople; the formula depends on linking the firm's overall performance expectations to each salesperson.

Straight commission is used by sales managers to reward salespeople for their accomplishments, rather than their time or efforts. Straight commission compensation fosters independence for the salesperson. It is a strong motivator in that payout only occurs if a sale is made, resulting in lower costs for the company. It is a favorable program for organizations that want to minimize compensation costs; especially for new and growing companies. There are some disadvantages of straight commission, which include the inability of sales managers to control selling activities, as well as high employee turnover.

Another compensation program frequently used by organizations is salary plus bonus. Essentially, the salary plus bonus formula includes base salary with a performance-based bonus paid when sales goals and quotas are achieved. Sales reps may also be evaluated on factors, including creation of new accounts, average gross margin, and after sales servicing. Unlike straight commission, this program helps to reduce the rate of employee turnover. The plan also encourages salespeople to build long-term relationships with their customers. By having the security of a consistent income, salespeople can be patient with their customers and allow them to take the time needed to make an informed decision. This is particularly important when buying cycles are long and when sales representatives need time to get acclimated with the buying cycle of the customer.

When selling complex products or services, a salary plus commission structure may be used to compensate the sales force. Under this program, a salesperson is guaranteed a base salary and is awarded a commission based on factors determined by the organization. Typically, a salary plus commission program is structured around upper and lower thresholds related to sales volume. For example, a salesperson may earn 4 percent on the first \$20,000 of sales volume each month, 5 percent on an additional \$15,000 and 6 percent on sales over \$40,000. Other firms may use different criteria, such as reaching sales quotas on the number of individual products sold in each product category. The advantages to this method are related to the flexibility of program. Firms are able to customize the program to meet corporate objectives as they relate to the sales force. Commissions can be spread out over a given period to ensure reps will continue to offer the customer a high level of service, and to discourage the reps from leaving the company after a big sale.

Salary plus commission and a bonus is a combination of the aforementioned programs. This plan combines the stability of a salary, the incentive of a

commission, as well as special bonus awards. Every activity of a salesperson is financially recognized by this program and is favored by salespeople because of the earning potential of the plan. The plan is not as popular as the others because of the complexity involved to administer the program.

Short-term incentive programs are often used by firms to motivate salespeople beyond standard compensation packages. Sales contests are the most common incentive used to generate excitement about selling products and services. The contests usually run for a limited time and include cash prizes or travel to those salespeople who achieve a certain level of sales. Timing of the contests is crucial. Typically, contests should be rolled out during the slower seasons of a given industry in order to boost sales and to generate incremental revenue.

RECRUITING A SUCCESSFUL SALES FORCE

The sales manager is responsible for recruiting salespeople by identifying sources for new employees, screening applicants, conducting interviews, contacting references, and recommending candidates to the regional manager. Typically, the regional sales manager recruits and selects new salespeople when needed. Often, candidates are found through universities, Internet sites, or applicants who formally apply to the company through cold-calling efforts.

Managers should identify certain key qualities when recruiting candidates for employment. Personality is an important factor when considering a candidate for a sales position. Empathy, ego and optimism are good personality attributes to consider when screening candidates for a sales position. Each of these attributes has a strong correlation to success in sales. Empathy is the ability to sense the reactions of another person and ego refers to the inner need to persuade another individual for one's own satisfaction. Both of these traits combined are predictors of a good salesperson and are strongly considered when recruiting and interviewing job applicants. Additionally, it is important to consider the applicant's level of optimism as it relates to personal achievement. Optimism and enthusiasm are good indicators of the ability of a salesperson to manage adversity and is a trait that is often needed to overcome rejection and slow sale months.

Although most companies have their own selection procedures, a typical candidate selection process will resemble the following:

1. First interview by district sales manager (Candidate is accepted and given a formal application or they are not accepted and sent a rejection letter.)

2. Candidates that submit an application are invited to a second interview with the district manager.
3. Candidates may spend a day in the field with a salesperson and the district manager receives feedback from the salesperson on the candidate's level of enthusiasm.
4. District manager checks the candidate's references and criminal background.
5. Regional sales manager interviews the candidate.
6. Regional manager and district manager discuss the candidate via telephone conference or personal meeting. (Decision is made whether to offer the candidate the position)
7. Regional sales manager formally offers the job to the candidate.
8. Physical examination is needed if offer is accepted by the candidate.

TOTAL QUALITY MANAGEMENT AND CUSTOMER SATISFACTION

A primary responsibility of a sales manager is managing relations with customers. The emergence of a global market for products and services has spurred new theories regarding management of products as they relate to the customer. Total quality management (TQM) is defined as a management process and set of disciplines that are coordinated to ensure that the organization consistently meets customer expectations. Originally defined as a manufacturing theory, TQM is now being applied to sales in particular. In the sales and marketing context, TQM defines the quality of the sales and service effort in terms of customer satisfaction. The goal of TQM is to sell service and quality driven value (rather than price), to create loyal customers, and long-term profits. Sales and service systems that link individuals, departments, suppliers and customers are central to TQM. Each department within an organization has a direct responsibility to the customer in some capacity. Marketing designs its new products with the customer in mind. Manufacturing focuses on achieving the highest level of product quality. Under TQM, challenging, but reasonable improvement goals are set for sales and service quality. Innovation and continuous improvement of the sales and servicing process is paramount to the idea of TQM.

The customer is considered from every aspect of TQM. By focusing on customer expectations and questioning them using formal techniques, TQM can discover previous misconceptions and new opportunities. Some fundamental ideas behind TQM are making continuous improvements to products and services,

eliminating defects, doing things right the first time, and understanding that employees closest to the process know how to improve the process. As a function of sales and service, TQM focuses on the exchange between the buyer and the seller. Intangible issues such as responsiveness to varying customer needs, empathy for customer concerns, reliable service performance, and assurance of service capabilities are considered when managing relationships with customers. This process is somewhat more difficult than actual management of product quality because customers are required to be participative in the process. They are expected to offer feedback to the company on products and services to allow for continuous improvement to the process.

Customer satisfaction is central to the philosophy of total quality management. In sales management, TQM suggests that organizations need to have the majority of employees in customer support functions, with fewer staff positions. This will help to eliminate costs associated with management and reduces levels in the decision making process. Fewer levels of management also allows for the organization to be flexible enough to change quickly to support new sales opportunities. Continuous improvement for all products and improvement in the selling process allows firms to consistently move forward with innovative products and services in order to remain competitive in the new global market.

CAREER PATHS

Sales management jobs are found in both consumer and commercial industries, in positions ranging from district manager, to vice president of marketing and sales, to top sales management of the firm. Competition for sales management jobs can be intense. Sales managers typically start out as salespeople, working their way to the top with strong leadership and organizational abilities. The progression of salespeople into management positions is gradual, with representatives moving into more executive positions by taking on more responsibility with larger, national accounts. It is likely that a sales representative will spend a portion of their career as a district or regional sales trainer, before moving into a senior sales management role. The progression of salespeople into management positions vary based on the size and organizational structure of the organization.

SEE ALSO: Customer Relationship Management; Employee Compensation; Employee Recruitment Planning; Human Resource Management; Motivation and Motivation Theory; Quality and Total Quality Management

Matthew Ross

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SCENARIO PLANNING

Strategic planning and forecasting tend to use projections of past events to develop future plans. These approaches rely on historical data and assume a continuation of past business practices and environmental stability. Scenarios are used to develop plans for significant changes in the environment, personnel, or processes for which data are limited and uncertain. The premise is that the best way to prepare for radically different situations is to think through various events that could occur and consider alternatives for responding to those situations if they should happen, (von Oetinger, 2004).

Major corporations such as Shell and General Electric redefined scenario planning in the 1970s to meet specific company needs. These companies realized that traditional planning, which is based on forecasts, was becoming strategically dangerous as they moved out of the relatively stable 1950s and 1960s. Traditional planning assumes that tomorrow's business world will be quite like yesterday's.

Scenario planning simply defined means creating a variety of possible future scenarios. Firms can then respond in one of two ways. First, firms may examine each scenario and determine whether the organization's current strategy would help them survive and succeed in those situations. Or, firms can examine a desired future state and see what they must do to get to that point. The purpose of this planning is to try to understand how the underlying dynamics of an industry can and how the organization could best respond to a change that could happen or to make a desired situation occur. The organization identifies certain events that could change the industry's structure and studies the present and future driving forces that might come into play that could cause such events. Scenario planning is effective for large organizations and small organizations alike. The organizations that utilize the plan the best are the ones that make scenarios relevant

to long-term needs, which may require a more focused approach. The ultimate purpose of this method seems to be the same for large and small organizations: to analyze the consequences of present actions and decisions; to identify and avoiding problems before they occur; to identify the present consequences of future events; and to envision aspects of possible or desired futures.

Scenario planning is different from other forms of strategic planning, such as forecasts and trend analysis. Scenario planning, in fact, uses both of these techniques, but also identifies how these can be upset and thus cause different outcomes. Some scenarios may seem nonsensical or highly improbable, but actually help organizations deal with major changes. Levi-Strauss uses the method to analyze the impact of everything from cotton deregulation to the total worldwide extinction of cotton. Similarly, businesses in energy intensive industries like trucking or airlines could benefit from considering what would happen to their business and how should they respond if gas prices were to reach \$2.50 or \$3.00 per gallon.

Scenario planning helps organizations understand that business decisions are not just about submitting numbers and creating budgets, but about recognizing a wider context of events that might happen. Scenarios are created around uncertainties in the business or its environment. The goal is to move from one predicted outcome to understanding how multiple uncertainties will impact an organization. Although every organization is different, success is higher when the company's strategy is correlated to changes in the environment, which can create opportunities for prepared organizations while creating threats to those less prepared.

In creating a scenario plan, these driving forces can be categorized into external and internal factors. External factors could include: market forces, which shape the needs and behaviors of consumers and suppliers; cost forces, which depend on the economics of the business; government forces, which are out of the hands of individual organizations but set the rules of the game; and, most importantly, competitive forces and uncertain strategic considerations. The need to match or beat competitors can determine the opportunities and threats of an organization. Internal factors could include planning for turnover of critical top managers, responding to major accidents, or significant changes in stock prices.

One pitfall of scenario planning is that organizations tend to make scenarios too broad or too narrow. When scenarios are too broad, people tend to dismiss them because they feel the scenarios are unrealistic or highly improbable. When they are too narrow, scenarios are usually minor variations of the existing strategy or the same theme.

There are many different approaches firms can use to develop meaningful scenarios. Schnaars and Ziamou suggest the following:

- Optimistic vs. best guess vs. pessimistic scenarios. This approach looks at the most likely (best guess) future situation based on current information. The optimistic scenario introduces question as to what things would or could happen to result in a better than anticipated outcome and how can the organization make those things happen? The pessimistic scenario looks at many of the things that could go wrong and tries to help decision makers plan responses to deal with these problems should they happen.
- Good vs. bad scenarios. This approach avoids the tendency to focus on the most likely alternative of the “best guess” and forces managers to give more attention to both extremes.
- Arrayed scenarios. These scenarios look at alternatives associated with a continuum along a single criterion or dimension. For example firms could plan their response to a slight, moderate, or severe change in the price for gasoline, or other key resource.
- Independently themed scenarios. This approach looks at different aspects of the future. One scenario could look at possible technological breakthroughs, another at environmental concerns, and a third at potential market changes. Each scenario is conceptually independent of the others.

After scenarios are created, strategies are developed by first determining the direction in which the organization should (or wants to) be going. The group then decides on the events that support this vision and the outcomes the organization wants for this event. This is sometimes difficult because the world is rapidly changing, and one designs his or her organization to deal with the change. Scenario planning is a valuable tool for an organization because it gathers the clues a company has and puts them together in different ways to allow people to think about them without making judgments.

Why should organizations implement scenario planning as opposed to other planning techniques? First, the company can use the method as an approach to risk management. The method attempts to answer questions like, “How do we come up with a strategy that’s possible in a wide range of different futures?” The organization can also use the method to upset the rules that everybody understands, to create new rules of competition. Scenario development causes firms to deviate from a linear projection of past business prac-

tices by developing potential situations that question traditional assumptions about the firm’s relevant industry, processes, markets, and people that may make it necessary to significantly alter the current strategy.

Scenario planning is effective when used properly by managers with good business judgment; it is not a substitute for business judgment. The process does not help an organization become better than they might be ordinarily, but helps utilize professional judgment across a wider range of alternatives.

SEE ALSO: Forecasting; Longitudinal Scenarios; Planning; Strategic Planning Tools

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SECURITIES AND EXCHANGE COMMISSION

The U.S. Securities and Exchange Commission (SEC) is an independent, nonpartisan, quasi-judicial regulatory agency that is responsible for administering federal securities laws. The main objective of these laws is to protect investors in securities markets in the United States from fraud and other dishonest activities. The laws are designed to ensure that securities markets operate fairly and that investors have access to disclosures of all material information concerning publicly traded securities.

Congressional investigations of the collapse of the stock market in 1929 and the subsequent Depression

found that investors suffered heavy losses for two major reasons. First, many companies had failed to disclose relevant information. Second, many misrepresentations of financial information had been made to the investors. The SEC was created to provide oversight in an attempt to prevent such a situation from arising again.

The SEC regulates firms engaged in the purchase and sale of securities, people who provide investment advice, and investment companies. The SEC may also provide the means to enforce securities laws through the appropriate sanctions. The commission may also serve in an advisory capacity to the federal courts in Chapter 11 cases (e.g., corporate reorganization proceedings under Chapter 11 of the Bankruptcy Reform Act of 1978).

ORGANIZATION

The SEC was established by Congress in 1934 under the Securities Exchange Act. The commission is made up of five commissioners, all of whom are appointed by the president of the United States with the advice and consent of the Senate. Each commissioner is appointed to a fixed five-year term; terms are staggered so that one expires on June 5 of every year. One of the commissioners is designated as chair by the president. As a matter of policy, no more than three of the five commissioners may be from the same political party. The commission employs financial analysts and examiners, accountants, lawyers, economists, investigators, and other professionals to carry on its responsibilities. The following description provides a listing of the principal divisions of the commission.

DIVISION OF CORPORATION FINANCE. Corporation Finance has the overall responsibility of ensuring that disclosure requirements are met by publicly held companies registered with the SEC. Its responsibilities include reviewing registration statements for publicly traded corporate securities, as well as documents concerning proxies, mergers and acquisitions, tender offers, and solicitations.

DIVISION OF MARKET REGULATION. This division is responsible for overseeing the securities markets and their self-regulatory organizations (such as the nation's stock exchanges), for registering and regulating brokerage firms, and for overseeing other market participants, such as transfer agents and clearing organizations. It also sets financial responsibility standards and regulates trading and sales practices affecting operation of the securities markets.

DIVISION OF ENFORCEMENT. The Enforcement Division has the responsibility of enforcing federal securities laws. These responsibilities include investigating possible violations of the federal securities laws and recommending appropriate remedies for consid-

eration by the Securities and Exchange Commission. The SEC typically brings between 400 and 500 civil enforcement actions per year against companies and individuals that it suspects of breaking securities laws.

DIVISION OF INVESTMENT MANAGEMENT. This division has the responsibility of administering three statutes: the Investment Company Act of 1940; the Investment Advisers Act of 1940; and the Public Utility Holding Company Act of 1935. The Division of Investment Management ensures compliance with regulations regarding the registration, financial responsibility, sale practices, and advertising of investment companies and investment advisers. New products offered by these entities are also reviewed by the staff in this division. The staff reviews and processes investment company registration statements, proxy statements, and periodic reports as per the laws specified under the Securities Act.

OFFICE OF COMPLIANCE INSPECTIONS AND EXAMINATIONS. This office conducts and coordinates all compliance inspection programs of brokers, dealers, self-regulatory organizations, investment companies and advisers, clearing agencies, and transfer agents. It determines whether these entities are in compliance with the federal securities laws, with the goal of protecting investors.

SECURITIES LAWS ADMINISTERED BY THE SEC

The Securities and Exchange Commission is responsible for enforcing the following seven major securities laws:

SECURITIES ACT OF 1933. The Securities Act imposes mandatory disclosure requirements on companies that sell their new securities through the securities markets. The act's base philosophy is to let the issuer disclose and to let the investor beware. This act is often referred to as the "truth in securities" law. The act requires that investors receive financial and other significant information concerning securities being offered for public sale. The act also prohibits deceit, misrepresentations, and other fraud in the sale of securities.

In 1975, Congress amended the Securities Act of 1933. The major focus of the amendment was the requirement that the SEC move towards establishing a single nationwide securities market. The law did not specify the structure of a national securities market, but it is assumed that any national market would make extensive use of computers and electronic communication devices.

SECURITIES EXCHANGE ACT OF 1934. The Securities Exchange Act of 1934 extends the disclosure concepts to securities already outstanding. The major provi-

sions of the Securities Exchange Act of 1934 are as follows:

1. The act created the Securities and Exchange Commission as a watchdog for the securities business.
2. It required listed companies to file registration statements and periodic financial reports with both the SEC and the exchange.
3. It gave the SEC the power to prohibit market manipulation, misrepresentation, and other unfair practices.
4. It required all national securities exchanges to register with the SEC and to be under its effective supervision and regulation.
5. It gave the Board of Governors of the Federal Reserve System the authority to control margin requirements.
6. It granted the SEC the power to control short selling, trading techniques, and the procedures of the exchanges.
7. It required officers, directors, and major stockholders to file monthly reports of any changes in their stockholdings.

PUBLIC UTILITY HOLDING ACT OF 1935. Interstate holding companies engaged, through subsidiaries, in the electric utility business or in the retail distribution of natural or manufactured gas are subject to regulation under this act. These companies, unless specifically exempted, are required to submit reports providing detailed information concerning the organization, financial structure, and operations of the holding company and its subsidiaries. Holding companies are subject to SEC regulations on such matters as system structure, acquisitions, combinations, and issue and sale of securities.

THE TRUST INDENTURE ACT OF 1939. Under the scrutiny of the SEC, this act applies to debt securities, including bonds, debentures and notes, and similar debt instruments offered for public sale and issued under trust indentures with more than \$7.5 million in securities outstanding at any one time. Even though such securities may be registered under the Securities Act, they may not be offered for sale to the public unless a formal agreement between the issuer of bonds and bondholder, known as the trust indenture, conforms to the statutory standards of this act.

INVESTMENT COMPANY ACT OF 1940. Under this act, activities of companies—including mutual funds—engaged primarily in investing, reinvesting, and trading in securities, and whose own securities are offered to the investing public, are subject to certain statutory pro-

hibitions and to Securities and Exchange Commission regulation. Public offerings of investment companies' securities must also be registered under the Securities Act of 1933. In this context, it should be noted that although the SEC serves as a regulatory agency in these cases, the SEC does not supervise the company's investment activities. The mere presence of the SEC as a regulatory agency does not in itself guarantee a safe investment for potential investors.

INVESTMENT ADVISERS ACT OF 1940. The Investment Advisers Act of 1940 establishes a pattern of regulating investment advisers. The main purpose of this act is to ensure that all persons, or firms, that are compensated for providing advising services to anyone about securities investments are registered with the SEC and conform to the established standards designed to protect investors. The SEC has the authority to strip an investment adviser of his or her registration should he or she be found guilty of committing a statutory violation or securities fraud.

SARBANES-OXLEY ACT OF 2002. The Sarbanes-Oxley Act, signed into law by President George W. Bush on July 30, 2002, marked the first significant reform of American business practices in decades. Passed in the wake of several financial scandals at major corporations, the Act was intended to enhance corporate responsibility, combat accounting fraud, and clarify financial disclosures. It also created the Public Company Accounting Oversight Board (PCAOB) to guarantee that the auditing profession remained unbiased in performing its vital role of ensuring corporate compliance with financial reporting standards.

U.S. government leaders hoped that the Sarbanes-Oxley Act would serve to clean up American capital markets, improve corporate governance, and restore investor confidence. High-profile cases of insider trading and fraud at such companies as Enron and WorldCom—which took place either under the noses or with the implicit approval of the major public accounting firms hired to audit them—has led to a movement to increase the power of the SEC.

SEE ALSO: Business Continuity Planning; Due Diligence; Ethics; Financial Issues for Managers; Financial Ratios

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SENSITIVITY TRAINING

Sensitivity training is often offered by organizations and agencies as a way for members of a given community to learn how to better understand and appreciate the differences in other people. It asks training participants to put themselves into another person's place in hopes that they will be able to better relate to others who are different than they are. Sensitivity training often specifically addresses concerns such as gender sensitivity, multicultural sensitivity, and sensitivity toward those who are disabled in some way. The goal in this type of training is more oriented toward growth on an individual level. Sensitivity training can also be used to study and enhance group relations, i.e., how groups are formed and how members interact within those groups.

HISTORY

The origins of sensitivity training can be traced as far back as 1914, when J.L. Moreno created "psychodrama," a forerunner of the group encounter (and sensitivity-training) movement. This concept was expanded on later by Kurt Lewin, a gestalt psychologist from central Europe, who is credited with organizing and leading the first T-group (training group) in 1946. Lewin offered a summer workshop in human relations in New Britain, Connecticut. The T-group itself was formed quite by accident, when workshop participants were invited to attend a staff-planning meeting and offer feedback. The results were fruitful in helping to understand individual and group behavior.

Based on this success, Lewin and colleagues Ronald Lippitt, Leland Bradford, and Kenneth D. Benne formed the National Training Laboratories in Bethel, Maine, in 1947 and named the new process sensitivity training. Lewin's T-group was the model on which most sensitivity training at the National Training Laboratories (NTL) was based during the 1940s and early 1950s. The focus of this first group was on the way people interact as they are becoming a group. The NTL founders' primary motivation was to help understand group processes and use the new field of group dynamics, to teach people how to function better within groups. By attending training at an off-site venue, the NTL provided a way for people to

remove themselves from their everyday existence and spend two to three weeks undergoing training, thus minimizing the chances that they would immediately fall into old habits before the training truly had time to benefit its students. During this time, the NTL and other sensitivity-training programs were new and experimental. Eventually, NTL became a nonprofit organization with headquarters in Washington, D.C. and a network of several hundred professionals across the globe, mostly based in universities.

During the mid-1950s and early 1960s, sensitivity training found a place for itself, and the various methods of training were somewhat consolidated. The T-group was firmly entrenched in the training process, variously referred to as encounter groups, human relations training, or study groups. However, the approach to sensitivity training during this time shifted from that of social psychology to clinical psychology. Training began to focus more on interpersonal interaction between individuals than on the organizational and community formation process, and with this focus took on a more therapeutic quality. By the late 1950s, two distinct camps had been formed—those focusing on organizational skills, and those focusing on personal growth. The latter was viewed more skeptically by businesses, at least as far as profits were concerned, because it constituted a significant investment in an individual without necessarily an eye toward the good of the corporation. Thus, trainers who concentrated on vocational and organizational skills were more likely to be courted by industry for their services; sensitivity trainers more focused on personal growth were sought by individuals looking for more meaningful and enriching lives.

During the 1960s, new people and organizations joined the movement, bringing about change and expansion. The sensitivity-training movement had arrived as more than just a human relations study, but as a cultural force, in part due to the welcoming characteristics of 1960s society. This social phenomenon was able to address the unfilled needs of many members in society, and thus gained force as a social movement. The dichotomy between approaches, however, continued into the 1960s, when the organizational approach to sensitivity training continued to focus on the needs of corporate personnel.

The late 1960s and 1970s witnessed a decline in the use of sensitivity training and encounters, which had been transformed from ends in themselves into traditional therapy and training techniques, or simply phased out completely. Though no longer a movement of the scale witnessed during the 1960s, sensitivity-training programs are still used by organizations and agencies hoping to enable members of diversified communities and workforces to better coexist and relate to each other.

GOALS OF SENSITIVITY TRAINING

According to Kurt Back, "Sensitivity training started with the discovery that intense, emotional interaction with strangers was possible. It was looked at, in its early days, as a mechanism to help reintegrate the individual man into the whole society through group development. It was caught up in the basic conflict of America at mid-century: the question of extreme freedom, release of human potential or rigid organization in the techniques developed for large combines." The ultimate goal of the training is to have intense experiences leading to life-changing insights, at least during the training itself and briefly afterwards.

Sensitivity training was initially designed as a method for teaching more effective work practices within groups and with other people, and focused on three important elements: immediate feedback, here-and-now orientation, and focus on the group process. Personal experience within the group was also important, and sought to make people aware of themselves, how their actions affect others, and how others affect them in turn. Trainers believed it was possible to greatly decrease the number of fixed reactions that occur toward others and to achieve greater social sensitivity. Sensitivity training focuses on being sensitive to and aware of the feelings and attitudes of others.

By the late 1950s another branch of sensitivity training had been formed, placing emphasis on personal relationships and remarks. Whether a training experience will focus on group relationships or personal growth is defined by the parties involved before training begins. Most individuals who volunteer to participate and pay their own way seek more personal growth and interpersonal effectiveness. Those who represent a company, community service program, or some other organization are more likely ready to improve their functioning within a group and/or the organization sponsoring the activity. Some training programs even customize training experiences to meet the needs of specific companies.

IN PRACTICE

An integral part of sensitivity training is the sharing, by each member of the group, of his or her own unique perceptions of everyone else present. This, in turn, reveals information about his or her own personal qualities, concerns, emotional issues, and things that he or she has in common with other members of the group. A group's trainer refrains from acting as a group leader or lecturer, attempting instead to clarify the group processes using incidents as examples to clarify general points or provide feedback. The group action, overall, is the goal as well as the process.

Sensitivity training resembles group psychotherapy (and a technique called psychodrama) in many

respects, including the exploration of emotions, personality, and relationships at an intense level. Sensitivity training, however, usually restricts its focus to issues that can be reasonably handled within the time period available. Also, sensitivity training does not include among its objectives therapy of any kind, nor does it pass off trainers/facilitators as healers of any sort. Groups usually focus on here-and-now issues; those that arise within the group setting, as opposed to issues from participants' pasts. Training does not explore the roots of behavior or delve into deeper concepts such as subconscious motives, beliefs, etc.

Sensitivity training seeks to educate its participants and lead to more constructive and beneficial behavior. It regards insight and corrective emotional or behavioral experiences as more important goals than those of genuine therapy. The feedback element of the training helps facilitate this because the participants in a group can identify individuals' purposes, motives, and behavior in certain situations that arise within the group. Group members can help people to learn whether displayed behavior is meaningful and/or effective, and the feedback loop operates continuously, extending the opportunity to learn more appropriate conduct.

Another primary principle of sensitivity training is that of feedback; the breakdown of inhibitions against socially repressed assertion such as frankness and self-expression are expected in place of diplomacy. Encounters that take place during sensitivity training serve to help people practice interpersonal relations to which they are likely not accustomed. The purpose is to help people develop a genuine closeness to each other in a relatively short period of time. Training encounters are not expected to take place without difficulty. Many trainers view the encounter as a confrontation, in which two people meet to see things through each other's eyes and to relate to each other through mutual understanding.

There is a difference between the scientific study of group dynamics (a branch of social psychology) and the human relations/group workshop aspect. The popularity of sensitivity training during the 1960s was due in large part to the emotional, experiential aspect. Yet many pragmatic advocates of sensitivity training felt it was necessary to avoid working with the most emotional converts, and conducted experiments in a laboratory in as realistic a situation as could be approximated, seeking a scientific approach more characteristic of psychological studies.

Other programs, not so concerned with the scientific validity of their studies or with freedom from distraction, offer full-time training programs during the day. Participants can choose on their own whether or not to maintain contact with the office for the duration

of training. Others offer part-time sessions for several hours a day, and the participants' daily routine is otherwise uninterrupted. Sensitivity-training programs generally last a few days, but some last as many as several weeks.

T-GROUPS

Within most training groups (T-groups), eight to ten people meet with no formal leader, agenda, or books—only a somewhat passive trainer. Trainers do not necessarily direct progress, just help participants to understand what is happening within the group. In defining a T-group, Robert T. Golembiewski explains the major distinguishing features as follows: “it is a learning laboratory; it focuses on learning how to learn; and it distinctively does so via a ‘here-and-now’ emphasis on immediate ideas, feelings, and reactions.”

The learning takes place within a group's struggle to create something meaningful for itself in an essentially unstructured setting. Issues that traditionally arise in such a setting include developing group norms and cohesion, reasons for scape-goating, selective communication channels, struggles for leadership, and collective decision-making patterns. Power struggles and decision-making conflict are the most prevalent problems as groups work toward establishing an identity and meet individual member needs. More specifically, group members can help each other identify when they are: attempting to control others or, conversely, when they are seeking support; punishing themselves or other group members; withdrawing from the group; trying to change people rather than accepting them; reacting emotionally to a given situation; and ignoring, rather than scrutinizing, behavior between group members.

Ultimately, T-groups were not a tremendously successful part of the sensitivity-training movement. This was in part because T-group trainers do not actually teach, but help people learn by assuming a more passive role. This sometimes confuses and upsets those who expect and desire more guidance. Another reason is that despite the intensity of the learning experience, most participants have difficulty quantifying exactly what they have learned and why it matters.

IN ORGANIZATIONS

Organizational goals appear to be the antithesis of those of sensitivity training. Sensitivity training is fueled on emotional outbursts in group settings, possibly leading to a change in attitude toward another individual. Desired results include more openness, spontaneity, and sensitivity to others. And while organizations are made up of people who interact and could benefit from such training, the goals of an organization are often more

related to increased production or higher profit margins than modifying means of interpersonal communication. To make sensitivity training work in organizational settings, the training must be adapted to the goals of the particular organization.

In its orientation as a study of group dynamics, sensitivity training is similar to the general concept of organizational development, a process by which organizations educate themselves in order to achieve better problem-solving capabilities. However, most sensitivity programs do focus on individual behavior within groups, while organizational development focuses on the group and how it works as a whole. Also, sensitivity-training groups are often composed entirely of people who are strangers to each other, while organizational-development programs seek to educate groups of people with shared working histories and experiences. Finally, the end goals of these training programs differ significantly. Sensitivity training, if successful, leads to self-awareness and insight that will help its participants in all aspects of life (including the workplace). Organizational development places more of its focus on becoming aware of one's role within workplace dynamics, leading to more effective group functioning (one of sensitivity training's goals, but with a more defined group in which to function).

POLITICAL CORRECTNESS AND THE RESPONSE TO SENSITIVITY TRAINING

The development of sensitivity training has led many critics to claim that such training is not really designed to help people be more sensitive to other people's ideas and feelings, but it is really crafted to change one's attitudes, standards and beliefs. These critics argue that sensitivity training merely wears people down until they conform to the mentality of the group, and agree that views of the group are acceptable, regardless of the value of the group idea or belief. These critics further assert that sensitivity training is often misused to force people into complying with community directives to conform to standards of political correctness. Political correctness has been defined as “avoidance of expressions or actions that can be perceived to exclude or marginalize or insult people who are socially disadvantaged or discriminated against” or the “alteration of language to redress real or alleged injustices and discrimination or to avoid offense.” For example, the politically correct (PC) word for someone who is crippled would be *disabled*, and the PC word for someone who is blind would be *visually impaired*. While political correctness seems like a good thing, opponents of the political correctness movement argue that it represents a totalitarian movement toward an ideological state in which citizens will be terrorized into conforming with the PC movement or risk punishment by the State.

This friction between advocates for sensitivity training and opponents of the PC movement has resulted in an emotional reaction to sensitivity training in the workplace. In spring, 2000, the Environmental Protection Agency announced to its Washington-area employees that it was planning a series of sensitivity training seminars to “create understanding, sensitivity and awareness of diversity issues and provide a forum for exchanging information and ideas.” The course failed miserably. The EPA employees complained the course literature was condescending and one-sided. Many employees seemingly felt that only certain ones of them were being asked to *be sensitive* to the others.

Proponents of the PC movement assert that it merely makes each of us a bit more sensitive to the challenges that our fellow citizens may face on a day-by-day basis. Clearly, the debate will continue. Sensitivity training will continue, and employers and other organizations will continue to assess whether its effectiveness warrants the costs.

SEE ALSO: Continuous Improvement; Feedback; Group Decision Making; Group Dynamics; Human Resource Management; Teams and Teamwork; Training Delivery Methods

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SERVICE FACTORY

The term *service factory*, coined by Richard B. Chase and Warren J. Erikson, represents the idea that the factory can be a source of customer service in addition to a place where products are manufactured. Since those who make products (factory workers) are often more knowledgeable about them than those in field service, it stands to reason that they can contribute to sales and marketing efforts. In addition, factory workers can be a resource for installation, maintenance and troubleshooting issues involving the products they had a hand in producing.

Richard B. Chase and David A. Garvin identify four (although there can be more) roles that the service factory can play in strengthening a firm’s marketing efforts. These roles are (1) laboratory, (2) consultant, (3) showroom, and (4) dispatcher.

LABORATORY. The service factory can easily serve as a laboratory for testing new products and processes thereby enhancing potential quality and manufacturability of the new products. In addition, the laboratory can serve as a test site for traditional to high-risk experiments to modify or improve existing operations. Chaparral Steel claims that their research and development is done right on the factory floor.

CONSULTANT. The service factory can also serve as a consultant, solving problems out in the field. Since they have worked extensively with both the firm’s products and processes, factory workers are a natural source of technical expertise when problems arise. Tektronix serves as a service factory consultant by providing a postcard with a toll-free number to a phone on the shop floor. In addition, factory floor workers can also serve as trainers for use of the product and quality control.

SHOWROOM. As a showroom, the service factory can serve as a working demonstration of the systems and processes the firm uses to manufacture products as well as a showcase for the factory’s products themselves. Nissan in Smyrna, Tennessee offers weekly tours, open to the public, where visitors ride a small train, complete with tour guide, through the manufacturing facility. Throughout the tour the train stops at points of interest, such as robots painting car bodies, where the tour guide emphasizes the quality and superiority of Nissan’s processes. Frito-Lay’s Vancouver, Washington plant offers three different factory tours, one for wholesalers, one for retailers, and one for the public.

DISPATCHER. As a dispatcher the service factory serves as the linchpin of after-sales support. The service factory can help their customers avoid stock-outs and the resulting downtime by quickly providing replacement

parts. This responsiveness can then be emphasized by the company's sales force. Of course, this requires that the dispatcher firm be able to anticipate demand surges.

In order to make the service factory work, manufacturing and marketing personnel must work well together. Shop floor employees will need to be trained in communication skills. In addition to marketing personnel, factory managers and workers must understand customer needs.

There is evidence that the service factory concept can be applied in countries other than the U.S. as examples have been explored in the U.K., Germany and Hungary. In addition there are recommendations that the service factory concept be applied throughout global supply chains and not just limited to single factory use.

SEE ALSO: Service Industry; Service Operations; Service Process Matrix

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SERVICE INDUSTRY

The growth of the service industry in the past two decades has prompted a number of questions about this sector of the American economy and the reasons for this trend. Some questions about the growth of the

service industry include: What is the service industry and what types of businesses operate in it? What are the trends in growth for the service industry and the reasons underlying its growth? How is the service sector affected by recessions and economic downturns? What are the human resources issues associated with the service industry? How is offshoring affecting American service jobs? What is expected in the future for the service industry?

DEFINITION OF THE SERVICE INDUSTRY

In the U.S. economy, jobs can be categorized into sectors, which can then be split into divisions, each of which include various industries. There are two major sectors in the U.S. economy, as identified by the U.S. Standard Industry Classification System: the goods-producing sector and the service-producing sector. The goods-producing sector includes agriculture, forestry, and fishing; mining; construction; and manufacturing. The service-producing sector includes the divisions of (1) transportation, communications, and utilities; (2) wholesale trade; (3) retail trade; (4) finance, insurance, and real estate; (5) public administration; and (6) services. This sixth group—the services division—includes a number of industries (see Table 1).

Table 1
Main Groups of Industries in the Services Division

- **Some agricultural services (including landscaping and horticulture)**
- **Hotels and other places of lodging**
- **Personal services (including dry cleaning, tax preparation, and hair cutting)**
- **Business services (including temporary agencies and business software developers)**
- **Automotive services**
- **Miscellaneous repairs**
- **Motion pictures**
- **Amusements and recreation**
- **Healthcare**
- **Legal services**
- **Private education**
- **Social services**
- **Museums, zoos, and botanical gardens**
- **Membership organizations (including houses of worship and clubs)**
- **Engineering and management services (including consulting)**
- **Other miscellaneous services**

The service sector is difficult to define and to encompass. There are a number of ways to identify the sector, its divisions, its industries, and the types of jobs within them. The general category of the service division includes a wide variety of industries, but can be

categorized into primarily consumer-oriented (providing a service directly to a consumer), primarily business-oriented (providing a service directly to another business) or mixed (providing services to both businesses and individual consumers).

Alternately, the services division activities can be described by their economic activities as physical, intellectual, aesthetic, and other experiential activities. Physical activities involve working with objects; examples include repairing cars, landscaping, cutting hair, or preparing a meal. Intellectual activities involve providing education or training, such as at a university or trade school. The aesthetic activities entail providing consumers with artistic or visual experiences; museums, theater performances, art shows, and musical performances are examples. Finally, other experiential activities involve providing customers with recreation, such as in amusement and theme parks, zoos, or campgrounds.

A final way in which to categorize services is by what is transformed through the service. A service may transform a physical object, which occurs when something is repaired, altered, or improved. Having an article of clothing custom-made, a room remodeled, or an appliance repaired would involve transforming a physical object. Service division jobs may also change a consumer. Examples of changes to consumers are education, whereby the consumer learns knowledge or skills; health care, in which a person's health is improved; or personal services, such as when a hairstylist cuts a consumer's hair. A change to an organization is a third type of transformation involved in the service industry. For instance, a management consulting firm may make changes to an organization's structure or business processes to improve it. The final set of jobs in this categorization captures those professions in which there is no apparent object. For example, when an attorney provides legal representation to a client, or in professional sports competitions a service is provided, even though no specific object can be identified.

GROWTH IN THE SERVICES DIVISION

Data from the U.S. Bureau of Labor Statistics indicates that more than 97 percent of the jobs added to U.S. payrolls from 1990 to 2002 were provided by the service-producing sector. In 1984, the number of jobs in manufacturing was relatively comparable to the number of jobs in the services, but by 1999, the service industry employed about twice as many individuals as manufacturing or government.

The three industries within the services division that experienced the most growth in the last decade have been (1) business services, (2) health care, and (3) social services. The business services areas in

which the largest number of jobs were gained were personnel supply and computer services. The personnel supply area includes organizations such as temporary employment agencies, traditional employment agencies, and other organizations that supply labor to other companies. The computer services industry includes mass-produced software, custom programming, custom computer systems design, and computer leasing. The primary reason for growth in both of these areas has been changes in business processes.

In the health care industry, there were four components that added large numbers of jobs: offices of physicians and other practitioners, nursing and personal care facilities, hospitals, and home health care. These components gained 430,000 to 1.2 million jobs each between 1990 and 2002. Two main reasons for this increase are new medical procedures, with which additional personnel are required to perform them, and because of the increased number of elderly persons in the U.S. and their requisite health care needs.

The third industry that gained the most jobs in the services division is social services. Social services encompass daycare for children, residential care for the elderly, and other family services; engineering and management services; private education; recreation and amusement; and membership organizations (e.g., houses of worship).

The reasons for growth in the largest growth area of the services division—the business-oriented services—can be linked to three broad economic developments relevant to those services: contractual arrangements, increased construction activity, and changes in technology.

First, contractual labor arrangements, such as outsourcing, have created opportunities in the field of personnel supply (e.g., temporary agencies and employee leasing). This is due primarily to the increased demand for temporary employees from U.S. businesses that want more flexibility in staffing and more control over labor costs. Additionally, as temporary and leasing agencies provide more training for the employees that they place with companies, this has made use of such agencies more attractive to many companies. A related reason for increased demand of such agencies is that many core employees are hired after a stint as temporary employees, which reduces recruitment and staffing costs for the companies utilizing temporary agencies. These contractual labor arrangements have also contributed to the growth of management services, such as consulting and facilities support. Finally, engineering services have changed; many engineers now operate under these new contractual arrangements rather than working for one employer as an employee.

The second major economic development that has led to growth in jobs in business-oriented services is the increase in construction activity. More construction brings higher demand for engineering, architecture, surveying, landscaping, and horticultural services. The third major economic development, improved technology, has driven a higher demand for computer services, such as computer repair, technical support, and software development. Management and engineering services, in the form of consulting, have also grown with this improved computer technology.

RECESSIONS AND THE SERVICES DIVISION

The U.S. Bureau of Labor Statistics (BLS) has studied the effects of economic recessions and expansions on the industries in the services division. The common wisdom has been that the service industry resists economic recessions; and to some extent that is true. Typically, the services do not show a decline in employment during the course of a recession. However, the BLS has found that some areas of the service sector are affected by economic downturns, indicated by a slowing of job growth.

Most areas of the services division are cyclical, which means that they are likely to experience slow growth or may even lose jobs during a recession. Engineering and management are the most cyclical areas of the services division and typically lose jobs in the average quarter of a recession. One reason for this is that these types of companies (e.g., management consulting firms, architectural firms) depend heavily on projects, not on ongoing production, which are likely to be cut back in times of economic recession. Business services are also cyclical, particularly with personnel supply (e.g., employment agencies) and computer services (e.g., custom software creation). Other cyclical areas are in agricultural services, because of the landscaping and horticultural component; automotive services, such as car rentals and repairs; miscellaneous repairs; the lodging industry; personal services, such as laundry, cleaning, and garment services; and motion pictures.

There are five areas of the services division that are deemed at least minimally counter-cyclical—that is, they gain jobs more quickly during a recession than in normal times. Health care services are the most counter-cyclical, gaining jobs rapidly during an economic downturn. This is likely due to the nature of this industry; health care is unaffected by recession because consumers see it as a necessity rather than something that can be used less often depending on the economy. Moreover, because much of U.S. health care costs are supplemented by Medicare, Medicaid, and private insurance, this funding is not susceptible to competition

with other types of purchases, and the benefits continue to be available to Americans during times of recession and unemployment.

The health care industry is one that is truly counter-cyclical; however, there is no strong consensus as to why this is. There is some evidence that health actually improves during economic recessions in the reduced use of tobacco and through improvements in diet and exercise. Thus, the demand for health care is unlikely to be driving the growth of this industry. Rather, some experts believe that the health care industry benefits from higher unemployment rates during a recession, because more people are likely to pursue jobs in the health care industry when unemployment is high. Because this industry tends to have many job vacancies, a recession may create a higher supply of employees to fill these jobs.

The other counter-cyclical service sector groups, as identified by the U.S. Bureau of Labor Statistics, are not truly counter-cyclical, in that they do not show statistical significance of this characteristic. However, they are likely to be less cyclical than the other areas of the service sector. One of these ostensibly counter-cyclical areas is private education, which is in higher demand when more people are unemployed due to an economic recession. That is, if people can't find jobs, they tend to go back to school, resulting in higher demand for teachers and administrators in public education. The other areas—child day care, amusements and recreations, and private colleges—exhibit their counter-cyclical tendencies because they tend to have fairly unattractive, low-paying jobs, which people are less likely to take in strong economic conditions, but more likely to take when the unemployment rate is high. A higher unemployment rate means that more attractive job opportunities in other industries are less available, and people must turn to less attractive jobs. Labor shortages in these lower paying industries are likely to be high in times of economic expansions, and thus these areas are less likely to be cyclical in their nature.

HUMAN RESOURCES IN THE SERVICES DIVISION

As jobs in the U.S. economy shift from the goods-producing sector to the services sector, so do many of the tasks involved in successful human resource management. Job analysis, recruitment and selection, training, performance appraisal, compensation, and labor relations are all likely to be affected by this current trend towards increased services jobs. There are a few specific concerns for human resources in the service industry:

Job analysis, which involves gathering information to understand how to successfully perform a job,

is likely to be conducted differently in service jobs than in manufacturing jobs. Because much of service work is knowledge work, in which job activities are less observable, this may mean differences in the way that job analysis is conducted. In service jobs, observation of job tasks may not be as useful as interviewing job incumbents or using a standardized form such as the Position Analysis Questionnaire.

Recruitment and selection practices in the services sector are as varied as the types of positions in this sector. The areas that are counter-cyclical or non-cyclical, however, may require stronger or more creative recruitment practices. As mentioned previously, many of the job areas that grow during economic recessions do so because there are fewer attractive job options available. Thus, during strong economic conditions, these areas (i.e., health care, day care, amusement and recreation, and private colleges) may have difficulty recruiting job applicants, and may need to be more innovative in their approach. During strong economic times, this may also mean that these counter-cyclical areas may find a lack of suitable job candidates, which may mean that selection criteria are changed, such that some skills are trained by the organization rather than having them present upon hire.

Training in the services sector may require increased attention to technology skills, as many service sector jobs now require the use of computers. Even entry-level retail jobs make use of computer technology for inventory and sales, and the ability to use these machines is critical. Additionally, customer-service skills are a crucial training need in many service industry jobs; thus, this type of training is likely to increase in value in service jobs.

Performance appraisal in the service sector is likely to be different than in the goods producing sector. While a physical accounting of performance through measuring production is possible in manufacturing and similar industries, it is less possible in service jobs. There may not be observable outcomes in service sector jobs. Thus, appraising performance by measuring behaviors is more appropriate for this sector. Additionally, outcomes other than production can be measured in service jobs: customer satisfaction, sales in a retail location, or other outcomes can be meaningful ways to measure performance.

Compensation in the goods-producing sector can be specifically linked to productivity (e.g., actual goods produced), but tying compensation to outcomes in the services sector may be more difficult. Some outcomes are easy to measure, such as in the number and value of homes sold by a real estate agent, but others are more difficult to assess, such as the degree to which a customer service representative has successfully resolved a customer's problem. Thus, compensation that effectively rewards and motivates employees must

be based on a performance appraisal that reliably and accurately captures performance. Human resources managers should use caution when developing rewards based on outcomes; a poorly designed incentive system may result in employees aiming for outcomes at the expense of customers. For instance, if a car repair shop pays employees for each new set of brakes they install, employees may begin to try to sell brakes to customers who don't need them in order to receive extra pay.

Labor unions originally grew in prominence in goods-producing jobs but now also represent many employees in the service industry. Although labor union membership has declined overall in recent decades, unions are still a presence in both manufacturing and service jobs. For instance, the Service Employees International Union (SEIU) is the largest and fastest growing union in North America, representing employees in areas of health care (e.g., nurses and nursing home employees), public services (e.g., schoolteachers and other government employees), building services (e.g., janitors and security guards), and industrial and allied employees (i.e., services in industrial companies). The SEIU has actually grown in membership over the years, from 625,000 members in 1980 to over 1.8 million today, and this growth has coincided with the increase of jobs in the services industry. Many service sector employees seek representation from a union due to concerns about pay, benefits, and job security that may not be as strong as in some other areas of the economy.

OFFSHORING

One topic that is becoming increasingly important to the services division of the U.S. economy is offshoring. Offshoring occurs when U.S. jobs and production are relocated to a foreign country. Offshoring can be contrasted with outsourcing, which occurs when a company contracts with another company to perform part of their work, but does not necessarily shift to a foreign country.

While offshoring has received a great deal of recent media attention and increasing in the U.S., levels of job losses in the service sector due to offshoring are small relative to total U.S. employment. McCarthy indicates that an estimated 103,000 jobs moved offshore in 2000, and Mark Zandi estimates that the loss in service jobs due to offshoring was about 75,000 per year from February 2001 to October 2003. U.S. employment statistics further indicate the small risk for offshoring of service jobs, with approximately 14 million jobs currently at risk for offshoring, but about 96 million jobs at low risk for offshoring in 2000. However, these estimates may either understate or overstate the total effect of offshoring on U.S. employment. New jobs may have been created overseas

by U.S. companies, rather than shifting existing jobs away from the U.S.

Offshoring of service jobs has increased and is likely continue to do so, experts believe. Research indicates that offshoring has increased pace in recent years. This trend is worrisome, because of the possible impact on the U.S. economy. Some analysts believe that the service sector taking longer to rebound from the 2001 recession is partly due to offshoring. McCarthy estimates that a cumulative job loss of 3.4 million jobs and respective wage loss of about \$151 billion will occur by 2015. The increase in offshoring has caught the attention of U.S. lawmakers, as Congress and state legislators have focused attention on the issue and have even introduced legislation to limit offshoring.

India has gained many U.S. service sector jobs through offshoring in recent years. Much of this is due to India's focus on becoming more prominent in the world in their information technology capabilities. Additionally, many Indians now pursue higher education to give them skills that prepare them for jobs in which there is a labor shortage. For instance, many U.S. employers are now hiring Indian call center agencies to provide customer service to clients in North America. Calls from overseas (e.g., American) customers are routed to an Indian call center, where an Indian employee who speaks English (often with little Indian accent) assists the customer with his or her computer problem or other customer service need. Because skilled Indian employees cost far less than similarly skilled American employees, offshoring for this job is very attractive to American companies wanting to cut costs. Author Paul Davies notes that the annual cost in 2003 of an American employee in a U.S. call center was about \$43,000 but that a similarly skilled Indian employee cost about \$6200.

THE FUTURE OF THE SERVICE INDUSTRY

As detailed above, the U.S. economy has experienced a shift from goods-producing jobs to service-sector jobs. Projections by the U.S. Department of Labor's Bureau of Labor Statistics expects this trend to continue with service jobs accounting for approximately 20.8 million of the 21.6 million new jobs from 2002 to 2012. In particular, jobs in the education and health services areas are expected to grow the fastest, adding more jobs than any other area of this sector at an estimated 31.8 percent. Additionally, professional and businesses services (e.g., employment services; professional, scientific, and technical services; computer systems design; management jobs) will grow at a high rate (30.4 percent). Jobs in information will increase by an estimated 18.5 percent; this area includes jobs related to software and Internet publishing and broadcasting, and Internet service providers. Another area that will increase is leisure and hospitality, with

employment growing by 17.8 percent due to an increased demand for leisure activities, accommodations, and food services. Trade, transportation, and utilities will increase by 14.1 percent in jobs related to transportation and warehousing; the retail trade; and water, sewage, and other utilities. A 12.3 percent growth is expected in employment in financial activities, with increases in jobs in real estate, finance, and insurance. Governmental service jobs should also grow at a rate of 11.8 percent, with jobs in public education and hospitals, state and local governments, and the federal government increasing in number. Finally, other non-governmental services that should increase at a predicted 15.7 percent are jobs in religious organizations, personal care services (e.g., hair stylists), and private household employment (e.g., cleaning services).

The services sector is distinct from the goods-producing sector in the U.S. economy, and includes a very wide variety of industries and jobs. The number of jobs in the services sector has been growing in recent years, and data from the U.S. government indicate that this trend will continue. While many service sector jobs are believed to be recession-proof, only some areas of that sector are truly counter-cyclical, and some are simply noncyclical, meaning that they resist job loss during times of economic downturn. As service sector jobs increase in number, there are new concerns for managing human resources, one of which is the issue of offshoring, which is increasingly slowly.

SEE ALSO: Human Resource Management; Outsourcing and Offshoring; Service Factory; Service Operations; Service Process Matrix

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SERVICE OPERATIONS

Services lie at the hub of economic activity in the United States. Service jobs account for almost 80 percent of total U.S. employment. As such, we say that the U.S. has a service economy. Within this service economy, the term service has several meanings when paired with other words. For example, a service firm is defined as one that derives more than 50 percent of its sales from providing services. RCA's service revenues now exceed its revenues from electronic manufacturing. A service package is a bundle of explicit and implicit benefits performed with a supporting facility and using facilitated goods. When you eat at a fast food restaurant (supporting facility), you may purchase a hamburger (facilitating good) that someone else cooked for you (service). The service concept is the perception and expectations of the service itself in the minds of the customers, employers, shareholders, and lenders. The service system is the equipment, layout, and procedures used to provide the service and maintain quality and delivery standards. The service revolution relates to the shift in the United States to a service economy and the proliferation of service automation.

A service operation is an open transformation process of converting inputs (consumers) to desired outputs (satisfied consumers) through the appropriate application of resources (family, material, labor, information, and the consumer as well). More simply, services are economic activities that produce time, place, form, or psychological utility. A meal in a fast food restaurant saves time. A meal with a date in an elegant restaurant with superior service provides a psychological boost. Wal-Mart attracts millions of customers because they can find department store merchandise, groceries, gasoline, auto service, dry cleaning, movie rental, hair styling, eyeglasses and optical services, and nursery items all in one place.

The U.S. economy consists of sectors producing goods and services. The goods-producing sector consists of manufacturing, construction, and extractive industries such as agriculture, mining, forestry, and fishing. Different types of services include business services such as consulting, banking and financial services; trade services such as retailing, maintenance and repair; social/personal services such as restaurants

and healthcare; public services such as government and education; and infrastructure services such as transportation and communication.

SERVICES IN THE UNITED STATES

Services are not peripheral activities, but are an integral part of society. Except for basic subsistence living, services are an absolute necessity for a functional economy and enhancement of the quality of life. While an industrial society defines the standard of living by the quantity of goods, a service society sees the standard of living through quality of life as measured by health, education, and recreation. The central figure in this society is the professional who can provide information rather than energy or physical strength. In addition, infrastructure services (communication and transportation) are seen as essential links between sectors of the economy. These infrastructure services are prerequisites for the industrialization of an economy, so no advanced society can be without them.

The United States, like most societies, began as an agricultural economy. As manufacturing became dominant, the economy became centered around industry. In the early part of the twentieth century, only 30 percent of those employed in the United States were working in services, with the rest in industry or agriculture. However, by 1950, half of the workforce was employed in services. In 1956, for the first time in the history of our industrial society, the number of white-collar workers exceeded the number of blue-collar workers. The United States can no longer be characterized as an industrial society, but rather as a postindustrial or service society. Services now account for approximately 70 percent of the national income and 80 percent of the jobs.

A traditional lack of productivity in the service sector is one reason for its increasing growth. Generally, productivity in services lags that in manufacturing and agriculture. As productivity grows faster in some segments (manufacturing and agriculture) these segments will invariably shed jobs that will then be picked up by the less productive sector (services). Also, during the past four recessions in the United States, service-industry employment actually increased as jobs in manufacturing decreased or were lost to other countries. This suggests that consumers will postpone purchases of hard goods but are not willing to give up services such as education, telephone service, banking, healthcare, and public services (such as fire and police protection). Finally, countries with successful manufacturing histories are the ones that now have the ability to create service jobs. There is a ripple effect from manufacturing to the creation of services, along with a continual stream of newly invented services for sale. Also, services can now be bought in greater quantities than in the past.

The fact is that the service sector has replaced the goods-producing sector as the economy's dominant force. This shift in the economic locus has variously been called the service sector revolution, the postindustrial revolution, the information age, and the technotronic age.

CHARACTERISTICS OF SERVICES

While the variety of services is endless, there are a number of characteristics that most services share. Services are generally performed with an open-systems perspective, that is, the system is not closed or isolated from the consumer as it is in manufacturing. The consumer is said to be within the service's "factory." There is a high degree of customer contact throughout the service process, with the customer frequently participating in the process itself. Customer participation within the process means that there is simultaneous production and consumption; thus, the service cannot be stored for later use, possibly as a buffer to absorb fluctuations in demand.

Although services can have tangible (high goods content) and intangible (low goods content) attributes, services are generally regarded as intangible, that is, you can't see, feel, or test a service's performance before purchasing it. Hence, reputation is extremely important. Since services are intangible, it makes sense that they can't be patented. The intangibility of services sometimes makes it difficult for the service firm to identify their product. Is the product at a restaurant the food itself, the service, or the atmosphere? Another problem, due to intangibility, is the difficulty in measuring output. Service output tends to be variable and nonstandard, making quality control and productivity measurement a problem. In fact, quality control is usually limited to process control. Even this is difficult since a high degree of personal judgment by the individual performing the service makes homogeneous input a near impossibility. Measures of effectiveness and efficiency are also subjective.

Services are time perishable. An empty seat on an airline means that that seat on that flight will never be available again. The same holds true for an empty hotel room. The empty room will never again be available on that particular night. The usefulness of service capacity is time-dependent—another reason that services cannot be inventoried and held for a later date. This means that services cannot be transferred or resold but must be sold directly to the customer. It also means that services cannot be mass produced.

Labor intensity is another characteristic of services. In fact, labor is usually the most important determinant of service organization effectiveness.

Site selection for services is usually dictated by the location of consumers. Preferably, services will

utilize decentralized facilities within close proximity to customers.

Services can also have very weak barriers to entry. Though not true for all services, many require little in the way of capital investment, proprietary technology, or multiple locations.

CLASSIFYING SERVICE FIRMS

Service firms can be classified according to their various characteristics. This allows clarification of the relationships between firms and customers and of potential strategies for competition.

A simple classification of services is by capital intensity and labor skills. This allows services to be grouped into equipment-based services and people-based services. Equipment-based services can then be subdivided into automatic services such as vending machines and automated car washes; services monitored by unskilled labor, such as dry cleaning and movie theaters; and services operated by skilled labor, such as excavating, airlines, and computer services. People-based services are subdivided into those utilizing unskilled labor, such as lawn care, security guards, and janitorial service; those utilizing skilled labor, such as appliance repair, plumbing, catering, electrical work, and auto body repair; and professional services such as law, medicine, accounting, and consulting.

Though generally thought of as a manufacturing tool, Wheelwright and Hayes's product-process matrix also provides a basis for classifying services. This framework groups firms based on their position on the product life cycle and product structure and their stage within the process life cycle and process structure, yielding the classifications of project, job shop, batch, repetitive-assembly, and continuous-flow manufacturing. Projects include professional services in which the process is characterized by a number of interrelated, well-defined activities, accomplished in a sequence. Doctors, lawyers, and architects typically manage a number of projects. Job shops and batches define services that are tailored to the customers' specifications. Repetitive assembly has a line flow, as do services that can be standardized and divided into routine tasks such as university registration, license renewal, and military medical examinations.

Richard Chase has argued that service delivery systems can be improved by separating them into high- and low-contact operations and managing them accordingly. High-contact services must have their operations near the customer and must be able to interact well with the public, since quality is often subjective (in the eye of the beholder). Output is variable, so wages have to be time-based. Low-contact services can place their operations near their suppliers, labor, or transportation, since the customer is not

in the environment. The workforce is required to have only technical skills, as work would be performed on a customer surrogate. This also allows wages to be output-based.

Roger Schmenner expanded this concept by including the degree of labor intensity and customization with the contact (interaction) classification. Service firms with low interaction/customization utilize standard operating procedures and pay less attention to physical surroundings. Firms with high interaction/customization strive to maintain quality, react to customer intervention and gain employee loyalty. Low labor-intensive firms concentrate on capital decisions, technological advances, maintaining a high utilization rate, and scheduling service delivery. Highly labor-intensive services emphasize workload scheduling, managing growth, hiring, training, and employee welfare.

In his 1986 article, "How Can Service Businesses Survive and Prosper," Schmenner provided a framework for understanding services and utilizing them strategically. This framework, which resembles Wheelwright and Hayes's Product-Process Matrix and is used in similar fashion, is called the Service Process Matrix. Within this matrix service firms are classified by their position on a graph with two dimensions. The horizontal dimension is the degree of labor intensity, which is defined as the ratio of labor cost to capital cost. The vertical dimension of the matrix measures the degree of customer interaction and customization. Firms that have a high degree of labor intensity and a high degree of interaction/customization are termed professional services. Service firms with a high degree of labor intensity but a low degree of interaction/customization are called mass services. Low labor intensity and a high degree of interaction/customization characterize the service shop, while firms with both low labor intensity and a low degree of interaction/customization constitute a service factory.

As with the product-process matrix, firms on the service matrix have strategic implications dependent upon where they fit within the matrix. Again like the product process matrix, service firms are generally more effective if they stay in close proximity to a diagonal running from the upper-left corner to the lower-right corner of the matrix.

SERVICES AND MANUFACTURING

Theodore Levitt, in his classic article, "Production-Line Approach to Service," describes how service managers can design their operations to achieve the economics of production. The design and conversion processes of services are sometimes called the "technical core." By insulating the technical core such that the customer has essentially no personal contact with the service providers, the business can operate more

efficiently. The technical core can be insulated by restricting the offerings (fast food restaurants have very limited menus); customizing at delivery (as computers are); structuring the service in such a way that the customer has to go where the service is offered (like banks); trying to incorporate self-service so that customers can shop at their own pace; and separating services that lend themselves to automation (ATMs and vending machines). By insulating the technical core one can essentially apply to services what has been learned in manufacturing, namely standardization and mass delivery. Levitt uses the example of McDonald's to provide a picture of a service that utilizes manufacturing techniques to the point that the end product results in what he terms the "technocratic hamburger." McDonald's makes use of a limited menu, division of labor, a standardized product (food preparers at McDonald's have little or no discretion when it comes to making the product), task grouping to allow specialized skills, and an assembly-line approach, all applied to the technical core that is insulated (away from the ordering and seating area) from the consumer.

LOCATION AND LAYOUT IN SERVICES

Location selection in services is a macro decision, while site selection is a micro decision. As with manufacturing, service location decisions involve such variables as expansion, impact on the environment, and governmental regulation. However, services also factor in such variables as access, visibility, traffic, competition and parking.

Service layout requirements are somewhat different from manufacturing but the same terminology is used. In both services and manufacturing we find the fixed-position layout, process layout, and product, or in this case, service-based layout. The fixed-position layout is the simplest. In this situation, the customer remains in one place throughout the service as materials and labor are brought to that location. If the customer or item being serviced must remain in one location, the service must relocate there, as with pool cleaning, landscaping, or home decorator consulting. In other cases, the nature of the equipment dictates a fixed position. Examples include dialysis machines, beauty salons, or psychiatric counseling.

In process layouts, similar machines, such as hair dryers in a beauty salon, are grouped together to produce batches of services (much the same as in the batch or disconnected line-flow process of the product-process matrix). University classrooms and movie theaters provide excellent examples of a process layout in a service environment.

If the equipment required to serve the customer is sequentially arranged according to the steps of the service process, the layout is said to be service-based

(or product layout). As in manufacturing, the product layout can be continuous (without interruption) and is usually lacking in flexibility. Drivers license renewal, registration for university classes, and cafeterias are examples of a service or product layout.

SERVICE OPERATIONS STRATEGY

As with manufacturing, service operations require a strategic approach. Metters, King-Metters, Pullman and Walton describe the strategic planning process as a hierarchy consisting of strategic positioning, service strategy, and tactical execution

STRATEGIC POSITIONING. Strategic positioning involves first defining the firm's target market. In other words, what is the set of customers the firm seek to serve. Next, the firm must determine its core competence or what will distinguish it from other service firms, i.e., cost leadership, differentiation, or focus. At this point, the firm then must make decisions regarding its mission and high-level goals and objectives.

SERVICE STRATEGY. At the service strategy level, the service firm must define its service concept, operating system and service delivery system. The service strategy links the firm's strategic position with tactical execution. The firm begins by determining its competitive priorities, and its order winners and order qualifiers. Competitive priorities are the characteristics of the firm or things that it does better than other service firms (e.g., low cost, quality, service, or flexibility). The firm's competitive priority(s) must be both an order qualifier and an order winner. The order qualifier is a characteristic that the service must possess in order to compete in the market. If the firm lacks this then the consumer will not even consider purchasing the firm's service. The order winner is the characteristic that will cause the consumer to purchase the firm's service over its competitors. The service concept then is the set of competitive priorities that the target market values.

The operating strategy describes how the firm's different functions (marketing, finance, and operations) will support the service concept. If the firm's order winning competitive priority is quality, what will operations do to ensure quality of the service and how will marketing promote this characteristic?

The service delivery system defines the components of the system necessary to execute the service concept. Examples of the needed variables are capacity requirements, quality management systems, and management policies. Each of these should support the firm's competitive priorities so that the firm is clearly distinct from its competitors.

TACTICAL EXECUTION. Finally, the firm approaches tactical execution issues. Tactical execution involves

the day-to-day activities required to function and support the service strategy. Included are capacity management, facility location, inventory management, facility layout, supplier selection, operations scheduling, staffing, and productivity improvement.

Decisions that are made in the above strategic planning process are heavily influenced by their position on Marc McCluskey's service maturity model. This model divides service maturity into four stages:

Stage 1: Baseline service—the focus is mainly on responding to requests in a timely manner.

Stage 2: Operational efficiency—the focus is on cost reduction

Stage 3: Customer support excellence—the focus is on efficiency

Stage 4: The focus is on changing the concept of service and growing market opportunity

McCluskey notes that most firms are still in stage 1, moving into the second.

AUTOMATION IN SERVICES

A recent phenomenon in services is the application of automation. Often services lag manufacturing and agriculture in productivity. One way to improve productivity in services is to remove the customer from the process as much as possible by whatever means possible. One way is the use of automation. Many of these applications are things we see everyday but give little consideration; most were introduced in fairly recent times.

Financial services have seen the proliferation of ATMs and the use of electronic funds transfer. Education makes use of PCs, audio-visual equipment, calculators, translation computers and electronic library cataloguing. Restaurants and supermarkets make wholesale use of optical scanning. If you have been to Las Vegas or an airport you have probably stood on a moving sidewalk. Hotels utilize electronic reservation systems, electronic locks, electronic wake-up calls, and message services. Other fields such as government, communication, healthcare, and the leisure industry have all benefited from the automation of services. As technology advances, we are likely to see more and more services being automated as service productivity increases.

SEE ALSO: Inventory Management; Layout; Operations Scheduling; Operations Strategy; Order-Winning and Order-Qualifying Criteria; Product-Process Matrix; Purchasing and Procurement; Service Process Matrix; Vendor Rating

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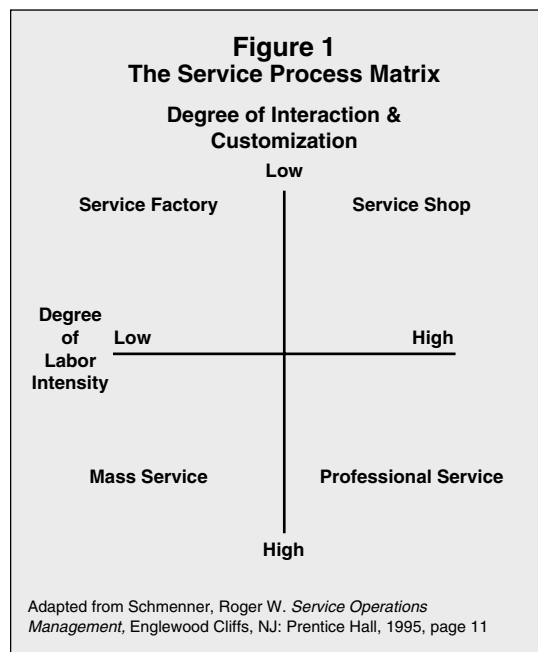
SERVICE PROCESS MATRIX

The Service Process Matrix is a classification matrix of service industry firms based on the characteristics of the individual firm's service processes. The matrix was derived by Roger Schmenner and first appeared in 1986. Although considerably different, the Service Process Matrix can be seen somewhat as a service industry version of Wheelwright and Hayes' Product-Process Matrix. The Service Process Matrix can be useful when investigating the strategic changes in service operations. In addition, there are unique managerial challenges associated with each quadrant of the matrix. By paying close attention to the challenges associated with their related classification, service firms may improve their performance.

The classification characteristics include the degree of labor intensity and a jointly measured degree of customer interaction and customization. Labor intensity can be defined as the ratio of labor cost to plant and equipment. A firm whose product, or in this case service, requires a high content of time and effort with comparatively little plant and equipment cost would be said to be labor intense. Customer interaction represents the degree to which the customer can intervene in the service process. For example, a high degree of interaction would imply that the customer can demand more or less of some aspects of the service. Customization refers to the need and ability to alter the service in order to satisfy the individual customer's particular preferences.

The vertical axis on the matrix, as shown in Figure 1, is a continuum with high degree of labor intensity on one end (bottom) and low degree of labor intensity on the other end (top). The horizontal axis is a continuum with high degree of customer interaction and customization on one ends (right) and low degree of customer

interaction and customization on the other end (left). This results in a matrix with four quadrants, each with a unique combination of degrees of labor intensity, customer interaction and customization.



The upper left quadrant contains firms with a low degree of labor intensity and a low degree of interaction and customization. This quadrant is labeled "Service Factory." Low labor intensity and little or no customer interaction or customization makes this quadrant similar to the lower right area of the Product-Process Matrix where repetitive assembly and continuous flow processes are located. This allows service firms in this quadrant to operate in a fashion similar to factories, hence the title "Service Factory." These firms can take advantage of economies of scale and may employ less expensive unskilled workers as do most factories. Firms classified as service factories include truck lines, hotels/motels, and airlines.

The upper right quadrant contains firms with a low degree of labor intensity but a high degree of interaction and customization. The upper right quadrant is labeled "Service Shop." Hospitals, auto repair shops and many restaurants are found in this quadrant.

The lower left quadrant contains firms with a high degree of labor intensity but a low degree of interaction and customization. This quadrant is labeled "Mass Service." Mass service providers include retail/wholesale firms and schools.

Finally, the lower right quadrant contains firms with a high degree of labor intensity and a high degree of interaction and customization. The lower right quadrant is labeled "Professional Service." This quadrant is similar to the upper left section of the Product-Process

Matrix where job shops and batch processes are found. Doctors, lawyers, accountants, architects, and investment bankers are typical service providers that tend to be labor intense and have a high degree of customer interaction and customization.

In 1994, Dotchin and Oakland proposed that in addition to the four categories: service factory, service shop, mass service and professional service, a fifth category should be added: personal service. They justify the inclusion by describing personal services as those directed at people, thereby high contact, as opposed to professional services which are directed to things, thereby, achieved with little contact time.

MOVEMENT WITHIN THE MATRIX

On Wheelwright and Hayes' Product-Process Matrix processes appear on a diagonal running from the upper left corner to the lower right corner. Firms that position themselves directly on the diagonal are seen to be the most efficient. Similarly, a notional diagonal can be said to run from the upper left corner to the lower right corner of the Service Process Matrix. Schmenner states that many of the segmentation steps taken by service firms have been toward the diagonal. The attraction seems to be better control. From the perspective of the matrix, need for control would be greater for service shops, which lie completely above the diagonal, and mass services, which lie below the diagonal. The need for control is not as great for service factories and professional services, as evidenced by the fact that the diagonal transverses each of those quadrants.

Schmenner also states that most services that have changed their positions within the matrix over time have tended to move up the diagonal. This, of course, implies a decrease in the degree of interaction and customization and a decrease in labor intensity. Those firms most affected by a move up the diagonal would be found in the professional services where labor intensity and interaction/customization was high. Obviously, any move up the diagonal, be it with professional services, mass service, or service shops, would be a movement toward the service factory.

The legal field, a Professional Service, is a prime example of "up the diagonal" movement. Most have surely noticed the increase of television advertising on the part of some in the legal profession. Other than personal injury, the most prolific amount of advertising seems to come from lawyers seeking cases involving bankruptcy and uncontested divorces. Obviously, these are the cases that require the least amount of customization. By handling this case "in bulk" the attorney also lowers the labor intensity by handling multiple cases in one trip to the court house and enjoys economies of scale just like a factory, a Service Factory.

The traditional restaurant had a considerable degree of customization, customer interaction putting it into the Service Shop category. The fast food industry has taken restaurants into the Service Factory area through the dramatic elimination of customization and lowering of labor intensity. However, the degree of standardization may vary.

Witness Wendy's where you can "hold the pickles; hold the lettuce, special orders don't upset us!" Also, hospitals have seen movement within the matrix. Consider Shouldice Hernia Centre in Canada, a hospital that specializes in one type of surgery so that customization is at it lowest, allowing them to run as a service factory rather than a service shop. Even banking has made movement toward the Service Factory with the universal use of ATMs.

Retailing has also seen changes within the Matrix. Warehouse stores such as Sam's Club and Internet sales have allowed retailers to move from Mass Service to Service Factory by drastically cutting labor intensity. However, some have gone in the opposite direction by becoming full-service boutiques and specialty stores stressing customer interaction, customization and labor intensity.

MANAGERIAL CHALLENGES

There are a number of proposed challenges for management that are inherent in a firm's position within the Service Process Matrix. For firms with low labor intensity, plant and equipment choices are extremely important, implying the need to closer monitor technological advances. Since capacity is somewhat inflexible, scheduling service delivery is more important so demand must be managed. For firms with high labor intensity, workforce issues such as hiring, training, employee development and control, employee welfare and workforce scheduling are critical. Firms with low customer interaction and customization face more marketing challenges than other firms.

The need to "warm up" the service dictates special attention to physical surroundings. For these firms standard procedures are safe to use. In addition, the classic managerial pyramid with many layers and a rigid relationship between layers is appropriate. Firms with high degrees of interaction and customization must manage higher costs resulting from lack of economies of scale. In addition, higher skilled labor costs more and demands more attention, benefits, quality of work life and benefits. The managerial hierarchy tends to be flatter and less rigid.

RECENT CHANGES

While the concept of the Service Process Matrix is conceptual or theoretical in nature, it should be noted that in 2000, Rohit Verma conducted an

exploratory study, using a broad sample of quantitative data, in an attempt to validate the idea that management challenges do differ across the different types of services represented by the quadrants of the Matrix.

Verma's findings did not closely match the proposed expectations. Capital decisions, technological advances and scheduling service delivery are perceived to be more of a challenge in high interaction/customization. Conversely, hiring, training, employee scheduling, and loyalty were found to become less important at interaction/customization increases.

The importance of managing employee career advancement and marketing of services increases as labor intensity increases. Capital decisions and fighting cost increases were found to be more important for the service factory and the service shop than for mass service and professional service. Starting new operations, workforce scheduling and managing organizational hierarchy were found to be more important for service factory and service shops.

As such, only four of 22 management challenge relationships proposed by the Service Process Matrix were supported by the empirical analysis. Despite this, the Product Service Matrix continues to be the standard classification scheme utilized in service research.

In 2004, Schmenner updated the Service Process Matrix by redefining the axes and the resulting diagonal. He had earlier stated that the lure of the diagonal was the need for control but later changed his mind. He stated that in retrospect, the issue was not control, but productivity that results from "swift, even flow." The concept of Swift, Even Flow argues that productivity increases as the flow of products and information becomes faster and variability decreases. Hence the X axis of the Service Process Matrix changes from interaction and customization to degree of "variation," in the sense that variation occurs in providing the service not that the firm provides a variety of services. Of course, interaction and customization are sources of variation.

The Y axis changes from labor intensity to relative throughput time. Throughput time is the time that elapses between the services or facilitating good's initial availability until the service is complete. The Service Process Matrix is now represented by Swift, Even Flow: Swift = relative throughput time; Even Flow = degree of variation; rather than degree of labor intensity and degree of customer interaction and customization.

Redefining the axes of the Matrix then causes the classification of services to change from the type service itself to the provider of the service. For example, in the previous Matrix, restaurants appeared as service shops. With the new axes, traditional restaurants are still service shops but gourmet restaurants could be considered professional service and fast food restaurants

(with their quick throughput time) would be service factories. Hence, particular services may now be spread out in the Matrix.

In order to improve productivity then, firms would strive to move left and upward or up the diagonal. The previously noted challenges for managers remain the same. Consider Southwest Airlines whose turnarounds are done swiftly with little variation.

Although, not all services fit cleanly into these quadrants, it is instructive, providing insight into service productivity. It also provides insight into how service firms differentiate themselves from each other as well as helping to explain why successful service firms achieved their positions and maintained them.

SEE ALSO: Product-Process Matrix; Service Operations

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SHAREHOLDERS

Shareholders or stockholders own parts or shares of companies. In large corporations, shareholders are people and institutions that simply invest money for future dividends and for the potential increased value of their shares, whereas in small companies they may be the people who established the business or who have a more personal stake in it. When investors buy shares of companies, they receive certificates that say how many shares they own. Owning shares of a company often entitles an investor to a part of the company's profits, which is issued as a dividend. In addition, shareholders are typically offered a fixed payout per share if the company is bought out. Because they are partial owners of a company, shareholders are

allowed to vote at shareholder meetings for certain company actions (such as approving or rejecting a merger proposal), review company accounts, and receive periodic reports on company performance. If shareholders cannot attend annual meetings, they are permitted to vote by proxy by mailing in their vote. Furthermore, if a company decides to issue more shares, current shareholders have the option to buy shares before they are offered to the public.

Shareholders are entitled to vote on a variety of issues, although the specific areas where shareholders have a say are determined by state laws and corporate bylaws. Generally, shareholders have the right to appoint a corporate president, elect members to a board of directors, and vote on significant changes in a corporation. These significant changes might include changes in the line of business, change of company name, and company divestments, acquisitions, and mergers. Boards of directors act on behalf of the shareholders and, in practice, make most decisions such as appointing corporate officers and reviewing corporate policies, finances, and strategies.

Shareholders may vote only during a corporation's annual shareholder meeting or at a special shareholder meeting, which would normally be called by the board of directors. A notice of the meeting and a notice of the agenda (the major points of the meeting) must be provided before each shareholder meeting. Shareholder voting power is proportionate to the number of shares each shareholder owns. For example, if a corporation had two shareholders—one with 400 shares and one with 100 shares—the one with 400 shares would wield far greater voting power.

Shareholders may own two kinds of stock: common stock and preferred stock. Owners of common stock have the last claim to company profits and assets and they may receive dividends at the discretion of a company's board of directors. In addition, common stock does not have a fixed value. Holders of common stock, therefore, profit when a company performs well and suffer losses when a company does not perform well. Nonetheless, common stockholders are typically the bulk of a publicly traded firm's shareholders and in many cases enjoy voting privileges that preferred stockholders lack. On the other hand, owners of preferred stock have first claim to a company's profits and assets. Investors may own three different kinds of preferred stock: (1) stock with preferred dividends that entitles them to a fixed dividend rate, (2) stock with preferred assets that allows them to receive to the first cut of the money from a company's sale, and (3) stock with both preferred dividends and preferred assets. Shareholders also may own redeemable and convertible stock. Redeemable stock allows a company to repurchase it at some point, whereas convertible stock enables stockholders to exchange preferred stock for common stock.

Companies sell their stocks to raise money. While they have other financing options such as loans and bonds, companies may choose to issue stocks because they need to raise more capital than they can readily borrow, because equity capital may be viewed as less costly than debt financing, or because favorable stock market conditions may present an opportunity for private owners to receive cash for part or all of their shares. Companies may sell their stocks either through private placement or public offerings. Private placement is usually limited to large institutions or a small group of individuals.

Before the rise of the publicly traded corporation, often the families that founded companies were the shareholders, managers, and members of the board of directors. But because these companies needed to raise increasing amounts of capital to expand, they eventually had to turn to outside investors. As a result, outside parties quickly became managers and members of the board. After offering shares to the public, founding family members still retained control of their corporations in many cases; however, shares also were dispersed among a variety of investors who had small holdings. This structure remained in place until the second half of the twentieth century when institutions such as banks, pension funds, and insurance companies began to accumulate large amounts of stocks in specific companies and became the major shareholders in the United States.

TYPES OF SHAREHOLDERS

Shareholders are generally classified as individual investors or institutional investors. Individual investors are individuals who invest their own money and institutional investors are organizations that invest the money of others. Institutional investors include insurance companies, banks, pension funds, and investment companies. The number of individual investors has risen over time, with slight decreases during periods of inflation or recession.

Table 1
Growth of Individual Shareholders

**Period Percentage of
U.S. families owning shares**

1989	17
1992	19
1995	15
1998	19
2001	21

Adapted From: *Survey of Consumer Finance*, Federal Reserve Board

Institutional investors also have increased in number and influence. While they once concentrated on short-term investments by planning strategic stock trades, they since have become major players in the long-term investment market. Moreover, institutional investors have been clamoring for a voice in company operations and they are the largest shareholders in the United States. The major institutional investors are pension funds, which invest retirement money. As a result of the trend towards concentration of stock in the hands of institutional investors, companies have become more attentive to their needs.

SIGNIFICANT NATIONAL EVENTS IMPACTING SHAREHOLDERS

In recent years, significant events have occurred in the United States that have directly impacted shareholders: the terrorist attacks of September 11, 2001 and the accounting scandals that were revealed in late 2001.

SEPTEMBER 11. On September 11, 2001, terrorists hijacked four planes that targeted major emblematic and financial centers in the U.S, with three of the four planes impacting their targets, the World Trade Center Towers in New York City, NY and the Pentagon in Washington, D.C. The impact on the U.S. Stock Market was immediate; the exchanges were closed on September 11 and remained closed for four consecutive days. The economy had slowed down prior to the attacks, with a sharp rise in unemployment rates and sluggish GDP growth; these events, coupled with the attacks, did not bode well for the stock market and the economy. Despite best efforts to reassure shareholders and shore up financial markets, stock market prices plummeted 14percentage as investors reacted in the first weeks following the terrorist attacks.

ACCOUNTING SCANDALS. In mid-October 2001, Enron Corporation, one of the largest energy companies in the world, shocked Wall Street by reporting huge losses and a dramatic reduction in shareholder equity. The U.S. Securities and Exchange Commission launched a formal investigation. On December 2, 2001, Enron filed for Chapter 11 bankruptcy. In January 2002, the U.S. Justice Department began a criminal investigation which ultimately revealed accounting discrepancies in the form of overstated earnings, underreported losses, improper transactions and partnerships created to conceal liabilities from investors, as well as the illegal shredding of thousands of key accounting documents, emails, and memorandums by Enron and their accounting firm, Arthur Andersen LLP. Arthur Andersen LLP was indicted by the U. S. Justice Department in March 2002 making it the first major accounting firm ever to be criminally prosecuted.

Starting in 2002 and continuing throughout 2004, various officers of Enron Corp. were prosecuted for their part in the demise of the company. Also in 2004, the remaining accounting firms, now known as the “Big Four”, were audited. The investigation into Enron and its fraudulent accounting acts spawned a flurry of similar investigations into Qwest, WorldCom, Global Crossing Ltd, and Tyco International Ltd, among others.

Shareholder confidence was sorely shaken which negatively impacted stock market prices, industry stability, and holdings in both personal and retirement accounts. In 2002, the government responded by passing regulations and safeguards designed to protect shareholder interests, the most impact being the Sarbanes-Oxley Act. The Sarbanes-Oxley Act provides accounting oversight in the form of the Public Company Accounting Oversight Board; requires chief executive officers to certify the accuracy of a company’s financial statements, with harsh penalties for knowingly falsifying financial reports; institutes federal criminal penalties for executives and companies who defraud shareholders; prevents investment firms from retaliating against negative criticisms by analysts and protects employees who act as ‘whistleblowers’ to reveal company misconduct.

In 2004, companies are still coming into compliance with the Sarbanes-Oxley Act and feeling the affects financially. The regulation of corporate accounting will continue to be an issue for many years to come.

SHAREHOLDER CONTROL AND CORPORATE DECISION MAKING

Since shareholders elect a corporation’s directors, they can exert a significant amount of influence on a company and its policies, because directors know that they might be fired if shareholders are not satisfied with their performance and their decisions. Nevertheless, shareholders traditionally have been interested mostly in return on investment and hence they have not played a major role in company operations or governance, which they have left to boards and management. However, in recent decades investors have at times bought stocks to seize control of companies.

The influential shareholders are usually institutional shareholders who own large quantities of a company’s stock and wield proportionate power. In contrast, individual investors have much less control and can influence decisions only by rallying large numbers of investors to support their position. Consumer advocate Ralph Nader introduced this process—often called a proxy fight—in 1969 to influence General Motors’ policies towards public transportation, women, and minorities. However, the Securities and Exchange

Commission issued a ruling in 1983 that helped prevent shareholders buying stocks solely to influence a company's operations. Despite this ruling, the practice of buying stocks to seize control of a company is common. When a company buys a significant share of stock of another company largely to influence its operations against its will, analysts refer to it as a hostile takeover. To prevent hostile takeovers, managers sometimes devote much effort to keeping stock prices high and other defensive tactics, although this strategy has harmed some companies ultimately.

One technique shareholders have used to link top management and shareholder goals has been issuing corporate executives stock options, which allow them to purchase stocks at some point in the future at a predetermined price. If the stock price rises significantly over time (that is, well beyond the predetermined level), these options can provide a substantial profit opportunity for their holders. Therefore, if stock prices rise, both top managers and shareholders benefit and, in theory, their interests are more closely aligned.

SHAREHOLDERS AND MANAGEMENT PERSPECTIVE

Two general perspectives on companies and social responsibility exist in the field of management, making successful management inherently difficult in that managers sometimes must choose between shareholder interests and employee interests. Nevertheless, the interests of shareholders, employees, customers, and other stakeholders ultimately are interconnected, not mutually exclusive.

SHAREHOLDER VALUE. Because of direct and indirect influence from shareholders and because of company dependence on shareholders, many companies make increasing shareholder value a key goal, if not the ultimate goal. Shareholder value refers to a company's value less its debt. In other words, companies create value for their shareholders when their investment returns are more than investment costs. Shareholders normally expect a minimum return on their investments that is equal to the going return on a low-risk investment (e.g., U.S. Treasury securities) plus a risk premium for the level of risk associated with a particular company. For example, a new Internet company is expected to deliver a higher return (higher premium) than IBM, but IBM is more certain of delivering its return (lower risk). As a company delivers such returns, in the form of dividends and share price appreciation, the company is said to be enhancing shareholder value or wealth. If a company is perceived as not increasing shareholder wealth over time, investors may lose confidence and either sell off its shares or pressure the company to take steps to improve its performance, such as by replacing the CEO or altering the corporate strategy.

Managers of a company that focuses on shareholder value will strive to remain abreast of shareholder interests. Consequently, Andrew Black et al. suggest in *In Search of Shareholder Value* that managers must think like entrepreneurs in order to meet shareholders' needs and add to shareholder value, which may require some refocusing if managers are accustomed to simply following the directions of their superiors.

To create additional shareholder value, managers must concentrate on a company's primary revenue-generating functions and running a company as efficiently as possible, which should help a company become a product or service leader and establish closer ties with consumers. Consequently, managers must begin their effort to increase shareholder value by identifying the key revenue-generating functions and then by promoting them. Furthermore, managers must distinguish between the interests of shareholders who have long-term interests in a company's worth and those who have short-term interests. Then they must strive to implement growth strategies that will benefit both kinds of investors insofar as possible, even though these interests may be in conflict with each other, according to J.P. Donlon and John Gutfreund.

However, this approach has come under the attack of employee advocates and other critics. In corporate theory, companies traditionally have been viewed according to the stakeholder model. This model suggests that a company can improve its financial conditions by attending to the needs and desires of its stakeholders, which include not only shareholders but also employees, distributors, customers, and so on. Shareholder and employee interests are sometimes viewed as being at odds with each other, especially around issues such as layoffs. According to the stakeholder model, managers should weigh the interests of one group of stakeholders against the interests of another in order to manage a company fairly. Hence, the shareholder value approach is controversial in that it gives priority to shareholder needs.

Supporters of the shareholder value approach defend their position by arguing that if a company is beholden to more than one interest group, then it will face the dilemma of having to decide between the different groups. If it must decide between competing interests, then the company must base this decision on some additional reason, but companies are hard-pressed to determine what the deciding criterion should be if not increasing shareholder value. The stakeholder model offers no suggestions. Without a decisive criterion, a company would constantly face this kind of dilemma, which would drastically slow-down the decision-making process. Such a dilemma could manifest itself, for example, as a proposal that would increase shareholder value and meet customer needs, but would result in the reducing the workforce.

However, a company does not ignore the interests of other stakeholders while concentrating on shareholder value. For example, employees will quit if their interests are not attended to and customers will patronize the competition if their needs are not met, and so management inevitably must take their needs into consideration. Finally, advocates of this approach contend that if a company fails to be profitable, then it will have to close, which would benefit none of the stakeholders.

EMPLOYEE/SHAREHOLDER PARTNERSHIPS AND THE STAKEHOLDER MODEL. However, not all analysts subscribe to the shareholder value approach to management. Instead, some insist on the stakeholder model, arguing that the needs of both major stakeholder groups—shareholders and employees—can be met if a corporate structure is adopted that breaks down the adversarial relationship between them. The idea is to establish partnerships that empower employees and allow them to play a more active role in company decisions, according to William McDonald Wallace in *Postmodern Management*. The partnership arrangement makes all members' income dependent on company performance, which makes a company's costs flexible and provides an impetus for members to be flexible. This type of relationship, Wallace argues, enables companies to weather recessions and adjust prices to meet pricing tactics of competitors. Consequently, this approach would benefit both shareholders and employees.

Furthermore, while the shareholder value approach can lead to gains and benefits for shareholders, it can also lead to layoffs and closures that adversely affect employees. Because of the ubiquity of shareholder-oriented practices of hostile takeovers, twenty-nine states passed laws to discourage such takeovers. These laws generally require corporate directors to consider the ramifications of their takeover plans on other stakeholders, especially employees. In addition, downsizing and layoffs are often attributed to too much emphasis on shareholder interests by management. Indeed, shareholders seem to encourage and applaud downsizing as stock prices typically increase on the announcement of impending layoffs alone.

Despite complaints from other stakeholders and despite alternative approaches, the shareholder orientation is forecast to remain the dominant bent of corporate management, according to William Beaver in his article "Is the Stakeholder Model Dead?" Beaver argues that three factors contribute to the institutionalization of the shareholder orientation: (1) the growing number of investors in the United States, (2) calls for the privatization of social security, and (3) the growth of using the stock market as a means for investing for retirement. If social security is privatized in part or in whole, investors will demand even more from companies in order to ensure that their stocks grow. Moreover, no opposing approach is gaining much

ground. The stakeholder model, for example, has no major driving force behind it; for instance, labor unions represent only ten percent of the country's workers. In addition, the Republican-controlled Congress of the late 1990s was reluctant to pass any legislation that would impede corporate profits.

Nevertheless, management must attend to the needs of other stakeholders besides shareholders—especially employees and customers—in order to attract and retain highly qualified employees and satisfy customers. Clearly, a company's competitive strategy and human assets underlie the kind of economic performance and profitability needed to sustain shareholder value creation; the two need not be seen as opposing interests. Moreover, management can improve shareholder value while meeting the needs of other stakeholders such as employees and customers.

CORPORATE MONITORS

Shareholders also have come to be seen as monitors of corporations and their management. As the former head of the U.S. Labor Department during the Reagan Administration, Robert Monks argued that shareholding was a responsibility, not the mere buying of favorable stocks and selling unfavorable ones. Instead, Monks argued that shareholders have the responsibility to intervene in a company's operations and help implement policies that will increase a company's worth.

SHAREHOLDER RELATIONS

Because shareholders are owners of the company and because they hold considerable power, the management of public companies faces two ongoing tasks: (1) meeting shareholder needs and providing shareholders with information on company performance and plans, and (2) maximizing the profit of shareholders. Providing shareholders with both of these is the essence of shareholder relations—and one without the other generally will fail to satisfy shareholder demands. Companies must develop information systems that provide shareholders with periodic reports on company performance, since receiving this information constitutes one of the basic rights of shareholders. While a company is required to provide basic information such as sales, profits, assets, and liabilities in annual and quarterly reports, the investors of the late 1980s and the 1990s began demanding more detailed, frequent, and understandable information. Financial analysts and institutional investors in particular have a need for additional information. The accounting scandals of the 2000s and resulting regulations are also demanding more comprehensive disclosure. Furthermore, Securities and Exchange Commission

regulations require public companies to release complete and timely information to shareholders. Hence, managers must make sure that the information they provide is current and not misleading. Management also benefits from putting forth effort to cultivate a knowledgeable pool of shareholders who are informed about company activities and goals, who will support management decisions, and who have realistic expectations of the company's potential.

To meet the information needs of different types of investors, some companies have two separate investor relations programs: one for individual investors and one for institutional investors. An individual investor program might include issuing a magazine that highlights key aspects of a company, an annual report, quarterly reports, and a proxy statement seeking support for company proposals by proxy. On the other hand, an institutional investor program might include all the reports and information given to individual investors as well as meetings with these investors in various cities where they are concentrated, periodic conference calls to discuss current results and events, and tours of corporate properties.

Shareholder relations responsibilities cut across a company, extending from company executives on down through the corporate structure. Some companies develop special investor relations departments to handle these responsibilities, while others divide them among various departments. Either way, management must set specific goals when developing a shareholder relations program and management can establish these goals by determining what support it seeks from shareholders and what shareholders think of the company, according to H. Peter Converse in his article for *Investor Relations: The Company and Its Owners*. Since every company is unique to some extent, the goals and methods for achieving the goals will vary from company to company.

By implementing a successful shareholder and potential investor relations program, companies also can accomplish their business goals of advancing company growth and profitability. Through investor relations, companies can increase their ability to raise funds via stock offerings, offer a competitive stock option program to court talented executives, and prevent hostile takeovers.

SEE ALSO: Corporate Governance; Knowledge Management; Stakeholders

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SIMULATION

Simulation is used to model efficiently a wide variety of systems that are important to managers. A simulation is basically an imitation, a model that imitates a real-world process or system. In business and management, decision makers are often concerned with the operating characteristics of a system. One way to measure or assess the operating characteristics of a system is to observe that system in actual operation. However, in many types of situations the cost of direct observation can be very high. Furthermore, changing some of the relationships or parameters within a system on an experimental basis may mean waiting a considerable amount of time to collect results on all the combinations that are of concern to the decision maker.

In business and management, a simulation is a mathematical imitation of a real-world system. The use of computers to conduct simulations is not essential from a theoretical standpoint. However, most simulations are sufficiently complex from a practical standpoint to require the use of computers in running

them. A simulation can also be considered to be an experimental process. In a set of experimental runs, the decision maker actively varies some of the parameters or relationships in the system. If the mathematical model behind the simulation is valid, the results of the simulation runs will imitate the results of the real system if it were to operate over some period of time.

In order to better understand the fundamental issues of simulation, an example is useful. Suppose a regional medical center seeks to provide air ambulance service to trauma and burn victims over a wide geographic area. Issues such as how many helicopters would be best and where to place them would be in question. Other issues such as scheduling of flight crews and the speed and payload of various types of helicopters could also be important. These represent decision variables that are to a large degree under the control of the medical center. There are uncontrollable variables in this situation as well. Examples are the weather and the prevailing accident and injury rates throughout the medical center's service region.

Given the random effects of accident frequencies and locations, the analysts for the medical center would want to decide how many helicopters to acquire and where to place them. Adding helicopters and flight crews until the budget is spent is not necessarily the best course of action. Perhaps two strategically placed helicopters would serve the region as efficiently as four helicopters of some other type scattered haphazardly about. Analysts would be interested in such things as operating costs, response times, and expected numbers of patients who would be served. All of these operating characteristics would be impacted by injury rates, weather, and any other uncontrollable factors as well as by the variables they are able to control.

The medical center could run their air ambulance system on a trial-and-error basis for many years before they had any reasonable idea what combinations of resources would work well. Not only might they fail to find the best or near-best combination of controllable variables, but also they might very possibly incur an excessive loss of life as a result of poor resource allocation. For these reasons, this decision-making situation would be an excellent candidate for a simulation approach. Analysts could simulate having any number of helicopters available. To the extent that their model is valid, they could identify the optimal number to have to maximize service, and where they could best be stationed in order to serve the population of seriously injured people who would be distributed about the service region. The fact that accidents can be predicted only statistically means that there would be a strong random component to the service system and that simulation would therefore be an attractive analytical tool in measuring the system's operating characteristics.

BUILDING THE MODEL

When analysts wish to study a system, the first general step is to build a model. For most simulation purposes, this would be a statistically based model that relies on empirical evidence where possible. Such a model would be a mathematical abstraction that approximates the reality of the situation under study. Balancing the need for detail with the need to have a model that will be amenable to reasonable solution techniques is a constant problem. Unfortunately, there is no guarantee that a model can be successfully built so as to reflect accurately the real-world relationships that are at play. If a valid model can be constructed, and if the system has some element that is random, yet is defined by a specific probability relationship, it is a good candidate to be cast as a simulation model.

Consider the air-ambulance example. Random processes affecting the operation of such a system include the occurrence of accidents, the locations of such accidents, and whether or not the weather is flyable. Certainly other random factors may be at play, but the analysts may have determined that these are all the significant ones. Ordinarily, the analysts would develop a program that would simulate operation of the system for some appropriate time period, say a month. Then, they would go back and simulate many more months of activity while they collect, through an appropriate computer program, observations on average flight times, average response times, number of patients served, and other variables they deem of interest. They might very well simulate hundreds or even thousands of months in order to obtain distributions of the values of important variables. They would thus acquire distributions of these variables for each service configuration, say the number of helicopters and their locations, which would allow the various configurations to be compared and perhaps the best one identified using whatever criterion is appropriate.

MONTE CARLO SIMULATION

There are several different strategies for developing a working simulation, but two are probably most common. The first is the Monte Carlo simulation approach. The second is the event-scheduling approach. Monte Carlo simulation is applied where the passage of time is not incorporated into the simulation model. Consider again the air ambulance example. If the simulation is set up to imitate an entire month's worth of operations all at once, it would be considered a Monte Carlo simulation. A random number of accidents and injuries would generate a random number of flights with some sort of average distance incorporated into the model. Operating costs and possibly other operating values sought by the analysts would be computed.

The advantage of Monte Carlo simulation is that it can be done very quickly and simply. Thus, many months of operations could be simulated in the ambulance example. From the many months of operational figures, averages and distributions of costs could readily be acquired. Unfortunately, there is also a potentially serious disadvantage to the Monte Carlo simulation approach. If analysts ignore the passage of time in designing the simulation, the system itself may be oversimplified. In the air ambulance example, it is possible to have a second call come in while a flight is in progress which could force a victim to wait for a flight if no other helicopter is available. A Monte Carlo simulation would not account for this possibility and hence could contribute to inaccurate results. This is not to say that Monte Carlo simulations are generally flawed. Rather, in situations where the passage of time is not a critical part of the system being modeled, this approach can perform very well.

EVENT-SCHEDULING METHOD

The event-scheduling method explicitly takes into account time as a variable. In the air ambulance example, the hypothetical month-long simulation of the service system would emerge over time. First, an incident or accident would occur at some random location, at some random time interval from the beginning point. Then, a helicopter would respond, weather permitting, the weather being another random component of the model. The simulated mission would require some random time to complete with the helicopter eventually returning to its base. While on that service mission, another call might come in, but the helicopter would probably need to finish its first mission before undertaking another. In other words, a waiting line or queue, a term often used in simulation analysis to indicate there are “customers” awaiting service, could develop. The event scheduling approach can account for complexities like this where a Monte Carlo simulation may not.

With a computer program set up that would imitate the service system, hundreds of months would be simulated and operating characteristics collected and analyzed through averages and distributions. This would be done for all the relevant decision-variable combinations the analysts wish to consider. In the air ambulance example, these would include various numbers of helicopters and various base location combinations. Once the analysts have collected enough simulated information about each of the various combinations, it is very likely that certain combinations will emerge as being better than others. If one particular design does not rise to the top, at least many of them can usually be eliminated, and those that appear more promising can be subjected to further study.

PROGRAMMING LANGUAGES

It was noted that while there is no theoretical need to computerize a simulation, practicality dictates that need. In the air ambulance example, analysts would require thousands of calculations to simulate just one month of operation for one set of decision-variable values. Multiply this by hundreds of monthly simulations, and the prospect of doing it somehow by hand becomes absolutely daunting. Because of this problem, programming languages have been developed that explicitly support computer-based simulation. Using such programs, analysts can develop either of the types of simulations mentioned here, a Monte Carlo simulation or an event-scheduling method simulation, or other types as well.

A particularly widely used language is called SIMSCRIPT. It is particularly well-suited to the event-scheduling method. The language itself has undergone several incarnations, so different versions, identified by Roman numeral, can be found on different computer systems. To apply this language, analysts would develop a logical flow diagram, or model, of the system they seek to study. SIMSCRIPT is a stand-alone language that can be used to program a wide variety of models. Thus, someone who uses simulation regularly on a variety of problem types might be well-served by having this type of language available.

Another widely used language is called GASP IV. It operates more as an add-in set of routines to other high-level programming languages such as FORTRAN or PL/I. With the rapid proliferation of personal computers in recent years, specific simulation software packages, simulation add-ins to other packages, and other capabilities have become widely available. For instance, a simple Monte Carlo simulation can be performed using a spreadsheet program such as Microsoft's Excel. This is possible because Excel has a built-in random number function. However, one must be aware that the validity of such random number functions is sometimes questionable.

One of the basic building blocks within any simulation language or other tool is the random number generator. Ordinarily, such a generator consists of a short set of programming instructions that produce a number that “looks” uniformly random over some numeric interval, usually a decimal fraction between zero and one. Of course, since the number comes from programming code, it is not really random; it only looks random. Any fraction between zero and one is theoretically as likely as any other. Such numbers can then be combined or transformed into apparently-random numbers that follow some other probability function, such as a normal probability distribution or a Poisson probability distribution.

This capability facilitates building simulations that have different types of random components within

them. However, if the basic generator is invalid or not very effective, the simulation results may very well be invalid even though the analysts have developed a perfectly valid model of the system being studied. Thus, there is a need for analysts to be sure that the underlying random number generating routines produce output that at least 'looks' random. There is a need for external validity in a simulation model, a need for the model to accurately imitate reality. There is just as critical a need for the building blocks within the model to be valid, for internal validity which can be a problem when an untested random number generator is employed.

EXPERIENTIAL GAMES

One particularly fast-growing area of simulation applications lies in experiential games. Board games that we played as youngsters were basically simulations. Usually, some kind of race was involved. The winner was the player who could maneuver their playing pieces around the board, in the face of various obstacles and opponents' moves, the fastest. The basic random number generator was usually a pair of dice. Computer-based simulations have expanded the complexity and potential of such gaming a great deal.

Management and business simulations have been developed that are sufficiently sophisticated to use in the college classroom setting. Almost all of these consist of specialized computer programs that accept decision sets from the game's players. With their decision sets entered into the computer program, some particular period of time is simulated, usually a year. The program outputs the competitive results with financial and operating measures that would include such variables as dollar and unit sales, profitability, market shares, operating costs, and so forth. Some competitors fare better than others because their decisions proved to be more effective than others in the face of competition in the computer-simulated marketplace. An important difference between board games and business simulations lies in the complexity of outcomes. The board game traditionally has only one winner. A well-developed business simulation can have several winners with different players achieving success in different aspects of the simulated market that is the game's playing field. Hence, business simulations have become very useful and effective learning tools in classroom settings. A fundamental reason for this lies in the fact that simulation permits an otherwise complex system to be imitated at very low costs, both dollar and human.

Simulation will continue to prove useful in situations where timely decision making is important and when experimenting with multiple methods and variables are not fiscally possible or sound. Simulation allows for informative testing of viable solutions prior to implementation.

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SIX SIGMA

SEE: Statistical Process Control and Six Sigma

SPAN OF CONTROL

Span of control or span of management is a dimension of organizational design measured by the number of subordinates that report directly to a given manager. This concept affects organization design in a variety of ways, including speed of communication flow, employee motivation, reporting relationships, and administrative overhead. Span of management has been part of the historical discussion regarding the most appropriate design and structure of organizations.

HISTORICAL DISCUSSION OF SPAN OF CONTROL

A small, or narrow, span of control results in each manager supervising a small number of employees, while a wide span of management occurs when more subordinates report directly to a given manager. A small span of management would make it necessary to have more managers and more layers of management

to oversee the same number of operative employees than would be necessary for an organization using a wider span of management. The narrower span of management would result in more layers of management and slower communications between lower level employees and top level managers of the firm. Recent moves to downsize organizations and to eliminate unnecessary positions has resulted in many organizations moving to wider spans of management and the elimination of layers of middle-level managers.

An argument for a narrow span of control was presented by V.A. Gaicunas, who developed a formula showing that an arithmetic increase in the number of a manager's subordinates resulted in a geometric increase in the number of subordinate relationships that a manager had to manage. According to Gaicunas, managers must manage not only one-to-one direct reporting relationships, but also relationships with various groups of subordinates and the relationships that exist between and among individual subordinates. The formula is shown below:

$$I = N(2N/2 + N - 1)$$

where I is the total number of interactions
and N is the number of subordinates.

Therefore, if a manager has two subordinates, there are 6 potential relationships to manage. However, if the manager's subordinates are increased to three, then the number of relationships is increased to 18. As the number of relationships increased, Gaicunas argued, the sheer number of interactions would exceed the abilities of the manager.

Researchers generally argue that a small span of management and a "tall" organization structure will be more expensive to operate because of the large number of managers and it may have communication problems resulting from the multiple levels of management. Such organizations are often seen as well suited for a stable, certain type of environment. A "flat" organization design resulting from a wider span of management would require managers to assume more administrative duties since those activities would be shared by fewer employees. It will also result in more employees reporting to each manager, increasing the managers' supervisory responsibilities. However, some research also suggests the wider span of management may cause employees to feel greater ownership of their work and increase their motivation, morale, and productivity. This type of organization design is often seen as effective in more uncertain environments.

FACTORS THAT MAY AFFECT SPAN OF CONTROL

While early discussions of span of control often centered on pinpointing the optimal number of subordinates, a number of factors may influence the span of

control most appropriate for a given management position. Assuming that all other aspects of a manager's job are the same, these factors would likely alter the span of management as follows:

1. Job complexity. Subordinate jobs that are complex, ambiguous, dynamic or otherwise complicated will likely require more management involvement and a narrower span of management.
2. Similarity of subordinate jobs. The more similar and routine the tasks that subordinates are performing, the easier it is for a manager to supervise employees and the wider the span of management that will likely be effective.
3. Physical proximity of subordinates. The more geographically dispersed a group of subordinates the more difficult it is for a manager to be in regular contact with them and the fewer employees a manager could reasonably oversee, resulting in a narrower span of management.
4. Abilities of employees. Managers who supervise employees that lack ability, motivation, or confidence will have to spend more time with each employee. The result will be that the manager cannot supervise as many employees and would be most effective with a narrower span of management.
5. Abilities of the manager. Some managers are better organized, better at explaining things to subordinates, and more efficient in performing their jobs. Such managers can function effectively with a wider span of management than a less skilled manager.
6. Technology. Cell phones, email, and other forms of technology that facilitate communication and the exchange of information make it possible for managers to increase their spans of management over managers who do not have access to or who are unable to use the technology.

The trend in recent years has been to move toward wider spans of control to reduce costs, speed decision making, increase flexibility and empower employees. However, to avoid potential problems of wide spans of control, organizations are having to invest in training managers and employees and in technology enabling the sharing of information and enhancing communication between and among managers and employees.

SEE ALSO: Empowerment; Management Styles; Organizational Structure; Organizing

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SPIRITUALITY IN LEADERSHIP

Before a definition of spirituality in leadership can be provided, one must first examine the meaning of the two key aspects of the phrase: the "spirit" and the "leader." One dictionary definition of spirit is "that which is traditionally believed to be the vital principle or animating force within living beings." Thus, the spirit relates to the deeper sense, meaning, or significance of something. A dictionary definition of the leader is "one who shows the way by going in advance; one who causes others to follow some course of action or line of thought." Thus, the leader is one who influences followers to think or behave in some way. Combining the two terms suggest that the leader who incorporates spirituality into his or her leadership will be one who causes others to seek out and understand their inner selves and who fosters a sense of meaning and significance among his or her followers. Thus, one definition of spirituality in leadership is a holistic approach to leadership in which the leader strives to encourage a sense of significance and interconnectedness among employees.

Spiritual leadership involves the application of spiritual values and principles to the workplace. The spiritual leader understands the importance of employees finding meaning in their work and demonstrates a genuine concern for the "whole" person, not just the employee. Spiritual leadership tries to assist others in finding meaning in their work by addressing fundamental questions such as:

- Who are we as a work team, department, or organization?
- Is our work worthy? What is our greater purpose?
- What are our values and ethical principles?
- What will be our legacy?

The spiritual leader strives for a workplace that is truly a community, consisting of people with shared traditions, values, and beliefs.

Spirituality in leadership implies that the focus will be less on formal position power and more on people; less on conformity and more on transformation and diversity; and less on controlling and more on partnership, collaboration, and inspiration. Spirituality in leadership does not require that the leader adhere to a particular religion or that he or she attempt to convince subordinates to pursue a specific set of religious principles. While leaders who emphasize spirituality may base their leadership approach in Christianity or another religious tradition, they may also have so-called "non-traditional" religious beliefs or may not adhere to any particular religion at all. Spirituality in leadership is more concerned with the development of employees as "whole people"—people who exhibit compassion to other employees, superiors, subordinates, and customers.

SPIRITUALITY IN THE WORKPLACE

Spirituality in leadership cannot be understood apart from the more general issue of spirituality in the workplace because spirituality plays an increasingly important part in the workplace. Many employees look to the workplace as a means of finding meaning in their lives. In today's world, many employees regard their workplace as a community—even as other "communities" that give meaning to people's lives are strained or ripped apart by modern styles of living. In the U.S. of the mid-twentieth century, for example, most people lived near, not only their immediate family, but also their extended family (i.e. grandparents, aunts, uncles, cousins). This is no longer the case, as many in the U.S. and around the world do not live in close proximity to their family of origin or extended family members. Thus, one's family is not an immediate and ready source of support for many individuals. This has led to a loss of identity and connectedness in people's lives, since people's families provide a rich context for self-understanding, personal growth, and maturity.

Similarly, the pattern of individuals' affiliation with formalized religion and religious institutions has undergone a dramatic change in recent years. Beginning in the 1960s, a general sense of dissatisfaction and skepticism about organized religion became common, particularly among younger people. In the subsequent years, rates of attendance at religious services and active involvement in religion declined worldwide. Although the majority of people today will self-identify as a member of some religious faith, many still do not attend formal religious services and have only a tenuous connection with a particular church, synagogue, etc. Thus, many people appear to be estranged from formal religion, which takes away another potential avenue to a sense of self-worth, identity and spiritual growth.

Likewise, many people used to find a sense of identity and connection in their neighborhoods and communities. This has changed as well. Many people relocate several times during their careers and spend relatively short periods of time in any one place. They do not put down roots in their local community, do not participate to a great degree in community events, and do not form strong relationships with neighbors. Anecdotal and survey evidence suggest that it is common for people to live next door or across the street from people and know almost nothing about them, even in small towns. In general, many people seem to be “drifting” without a strong connection to others or overall sense of purpose.

Within this context, it is easy to explain why so many people seek to derive great meaning from their work and their organizations. Most spend more time in the workplace with their coworkers than anywhere else. Close friendships, courtships, and marriages are common among coworkers. The modern workplace is not just a place where people work, but a place where they form friendships, socialize, and attempt to find a sense of fulfillment. It is also a place where people attempt to make sense of and derive meaning from the activities that comprise what we call “work” and how these activities fit within the greater fabric of individuals’ lives. This quest for meaning has prompted the recognition that spirituality in the workplace and spiritual leadership are real issues affecting the quality of life in the modern organization.

THE ROLE OF LEADERSHIP IN DEVELOPMENT

The study of leadership is multi-faceted and definitions of leadership vary, but in general, all definitions of leadership agree that it involves exerting influence on other people. If a leader in the workplace possesses a strong sense of spirituality that affects his or her attitudes, emotions, and behaviors in a positive way, then the leader is likely to influence subordinates to pursue the development of spirituality in their own lives. This raises at least two questions: “What leadership approach or style effectively promotes spirituality in the workplace?” and “What benefits are derived from fostering spirituality in the workplace?”

There appears to be a shift in approaches to leadership in the workplace, with an increasing focus on more holistic approaches that focus on compassion, encouragement, empathy, and service. Some contend that the greatest aspects of leadership are assisting followers in finding meaning and purpose in their work and fostering a sense of community among followers. This point of view suggests that spirituality in leadership does not involve directives and the chain of command, but transformational leadership that defines the organization’s values and helps followers perceive that

they are contributing to a valuable and worthwhile goal set.

Although there is little if any empirical evidence that any particular leadership approach or style would be more or less consistent with spirituality in the workplace, two leadership approaches seem to be more closely related to the concept of spiritual leadership than others: servant leadership and transformational leadership.

SERVANT LEADERSHIP. Servant leadership is not a full-fledged theory of leadership but can be thought of as a philosophy of leadership. It de-emphasizes the position of power or elite status of the leader. Instead, this approach to leadership suggests that the leader must first be a servant of others. It suggests that leaders must place the needs of subordinates, customers, and the community ahead of their own interests in order to be effective. Characteristics of servant leaders include empathy, stewardship, and commitment to the personal, professional, and spiritual growth of their subordinates. Servant leadership is consistent with aspects of Christianity, but is not a “Christian” theory per se. Servant leadership has not been subjected to extensive empirical testing but has generated considerable interest among both leadership scholars and practitioners.

TRANSFORMATIONAL LEADERSHIP. Beginning in the 1970s, a number of leadership theories emerged that focused on the importance of a leader’s charisma to leadership effectiveness. Included within this class of theories are House’s theory of charismatic leadership, Bass’s transformational leadership theory, and Conger and Kanungo’s charismatic leadership theory. These theories have much in common. They all focus on attempting to explain how leaders can accomplish extraordinary things against the odds, such as turning around a failing company, founding a successful company, or achieving great military success against incredible odds. The theories also emphasize the importance of leaders’ inspiring subordinates’ admiration, dedication, and unquestioned loyalty through articulating a clear and compelling vision.

Transformational leadership theory differentiates between the transactional and the transformational leader. Transactional leadership focuses on role and task requirements and utilizes rewards contingent on performance. By contrast, transformational leadership focuses on developing mutual trust, fostering the leadership abilities of others, and setting goals that go beyond the short-term needs of the work group. Bass’s transformational leadership theory identifies four aspects of effective leadership, which include charisma, inspiration, intellectual stimulation, and consideration. A leader who exhibits these qualities will inspire subordinates to be high achievers and put the long-term

interest of the organization ahead of their own short-term interest, according to the theory. Empirical research has supported many of the theory's propositions. Thus, transformational leadership styles would seem to be consistent with a spiritual approach to leadership.

THE BENEFITS OF SPIRITUALITY IN LEADERSHIP

Since there has been little empirical research regarding spirituality in the workplace or spiritual leadership, it is difficult to say precisely what the benefits (or costs) of spirituality in leadership will be. However, enough conceptual and empirical research has been conducted to suggest several potential benefits of incorporating a spiritual dimension into leadership. From the perspective of followers, incorporating spirituality into leadership has the potential to create a workplace that is more humane and that provides a sense of community and shared purpose. From the perspective of the organization, incorporating spirituality in leadership may lead to greater perceptions of trust, organizational support, and commitment among employees, which could have positive effects on organizational performance. However, spirituality in leadership should not be thought of as a "device" for developing positive organizational outcomes, but must instead be a genuine philosophical belief on the part of leaders.

SEE ALSO: Leadership Styles and Bases of Power; Leadership Theories and Studies

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STAKEHOLDERS

A firm's stakeholders are the individuals, groups, or other organizations that are affected by and also affect the firm's decisions and actions. Depending on the specific firm, stakeholders may include governmental agencies such as the Securities and Exchange Commission, social activist groups such as Greenpeace, self-regulatory organizations such as the National Association of Securities Dealers, employees, shareholders, suppliers, distributors, the media and even the community in which the firm is located among many others. The following discussion divides the stakeholder perspective into three categorizations, but it is important to realize that firms do not always initially set out to establish one perspective over another. Instead, firms tend to develop their views of stakeholders and stakeholder management over time in reaction to events that unfold throughout the firm's history.

STAKEHOLDER PERSPECTIVE

Although numerous ways of viewing stakeholders exist, categorizing stakeholder perspectives into three broad categories helps elicit the basic underlying themes among these numerous views. These broad categorizations include the separation perspective, the ethical perspective, and the integrated perspective.

THE SEPARATION PERSPECTIVE. The separation perspective suggests that, because managers are agents of the firm's owners—the shareholders—managers should always strive to act in the best interest of the firm's owners. This view does not cause managers to ignore non-owner stakeholders; indeed, when taking actions that benefit stakeholders also benefit owners, the separation perspective would advise managers to do so. One facet that differentiates this perspective from the others, however, is the rationale behind such decisions; the reason managers make decisions and take actions benefiting non-owner stakeholders is ultimately to reward owners. Clearly, problems arise when a given decision would maximize the benefit to non-owners at the expense of owners, but that would serve the greater good of society in general. For example, suppose a new but relatively expensive technology was created that lowered pollution from steel mini-mills below the level required by the Environmental Protection Agency (EPA). In this case, there is no law requiring the steel mini-mills to purchase and implement the new technology, but doing so would benefit stakeholders such as the community in which the mini-mill had factories. Yet, due to the cost of the new technology, owners' profits would suffer. The separation perspective would direct managers in this situation to dismiss the benefit of lower pollution

levels for the community in favor of maximizing owners' profits by meeting EPA requirements, but not by spending funds in excess of what the EPA requires.

THE ETHICAL PERSPECTIVE. The ethical perspective is that businesses have an obligation to conduct themselves in a way that treats each stakeholder group fairly. This view does not disregard the preferences and claims of shareholders, but takes shareholder interests in consideration only to the extent that their interests coincide with the greater good. Budweiser, for example, has modified its advertising over the years to discourage under-age drinking and driving while intoxicated. Social activist groups such as Mothers against Drunk Drivers have pressured Budweiser through their own advertising as well as media attention to maximize responsible alcohol consumption even though this may decrease overall sales for Budweiser. This approach focuses on ethics and suggests that managers have responsibilities apart from profit-oriented activities. While recognizing the claims shareholders have to profit in exchange for putting their capital at risk, the stakeholder perspective that holds ethics as the preeminent decision rule. Taken to an extreme, this perspective can minimize the right of owners to participate in financial gain in proportion to the risks they bear when doing what is ethically best for non-owner stakeholders runs counter to what is financially best for owners. A possible outcome in a capitalistic society could be that fewer and fewer owners place their capital at risk through firm ownership, a condition that may ultimately decrease the economic good of society in general and thus harm the very groups the ethical perspective intended to protect.

THE INTEGRATED PERSPECTIVE. The third approach, the integrated perspective, suggests that firms cannot function independently of the stakeholder environment in which they operate, making the effects of managerial decisions and actions on non-owner stakeholders part and parcel of decisions and actions made in the interests of owners. This view holds that managerial decisions and actions are intertwined with multiple stakeholder interests in such a way that breaking shareholders apart from non-owner stakeholders is not possible. Managers who, according to this approach, make decisions in isolation of the multitude of stakeholders and focus singly on shareholders overlook important threats to their own well-being as well as opportunities on which they might capitalize. For example, the National Association of Securities Dealers (NASD) is a self-regulatory organization that monitors and disciplines members such as insurance companies and brokerages. By incorporating NASD regulations into their management decisions and actions, insurance companies and brokerages, at least to some extent, preempt outside governmental action that may make compliance more restrictive or cumbersome. The NASD, in turn, answers to the governmental agency, the Securities and Exchange Commission

(SEC). The SEC reports to the U.S. Department of Justice. Each of these—insurance companies and brokerages, the NASD, SEC, and U.S. Department of Justice—are linked in such a way insurance companies and brokerages ignoring these stakeholders would quickly be unable to make a profit and thus fail to serve the interests of owners.

EMERGENCE OF THE STAKEHOLDER PERSPECTIVE

The conventional thinking dominating the early management literature with the rise of management as a "profession" separate from the firm's owners was that, as agents representing owners, top managers' responsibility was primarily and ultimately to these owners or shareholders. Increasingly, though, managers have come to view non-owner stakeholders as essential to firms' success, not only in financial terms, but also in societal terms (Rodgers and Gago, 2004). However, this has not eliminated managerial decisions that are overly concerned with financial performance at the expense of other stakeholder interests. The collapse of Enron and WorldCom early in the twenty-first century, charges of accounting fraud against firms such as Tyco and Time Warner, Medicare fraud by HealthSouth and United Healthcare illustrate that despite the apparent logic of an integrated perspective of stakeholder management, some managers still hold to the separation perspective. As shareholders of these and other firms have seen, however, is that sole regard to financial results is not always in the best interests of these shareholders. Those holding Enron and WorldCom stock, even those who knew nothing about illegal activities by the firm's top management, quickly came to realize that excluding non-owner stakeholders is not necessarily consistent with maximizing shareholder wealth. In fact, excluding non-owner stakeholders can inadvertently bring more pressure on managers when non-stakeholder interests are not respected. Consider, for instance, additional regulations to which firms must now comply in the wake of many of these situations. The Sarbanes-Oxley Act creates additional reporting requirements in attempts to prevent accounting abuses in the future. Estimates suggest that compliance will coast an average of \$35 million per year for large firms with revenues in excess of \$4 billion. Obviously, then, neglecting non-owner stakeholders is not always in the best interest of shareholders even if managers take the separation perspective to stakeholder management.

The separation perspective can be traced at least as far back as 1776 when Adam Smith wrote *An Inquiry into the Nature and Causes of the Wealth of Nations*. Among Smith's most quoted lines is in the work's preface and states: "It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own

interest.” This reference to what has come to be known as laissez faire capitalism positions self-interest as the most prominent feature of national industrial development. Yet, even though he did not specifically use the term, Smith also realized that stakeholders outside the firm have an important part to play in industrialization. By making provision for what he called the “public good,” Smith disseminated the idea of owners’ self-interest as a critical variable promoting economic growth, while also realizing that unchecked self-interest must be balanced against the greater good. In this respect, then, the separation perspective and the integrated perspective, while not fully formed, both have their roots in early industrialism.

The ethical perspective stems at least back to the eighteenth-century writings of philosopher, Immanuel Kant. The focus of the ethical perspective is the firm’s responsibility to stakeholders from a normative view; that is, the ethically correct action should supercede actions based solely on self-interest, thus making managerial decisions and actions that impact stakeholders based on universal standards of right and wrong the rule that managers should follow. This standpoint, though, suffers from shortcoming stemming from different standards of right and wrong. When right and wrong are apparent, decisions are easy, but management challenges are rarely so clear. Simply suggesting that managers do the “right thing” ignores conflicts of interest inherent in capitalistic competition, and doing the right thing can result in compromises that are not in the best interests of any of the stakeholders, but rather a way to satisfy or make decisions and take actions that are “good enough,” but not optimal. The ethical view of stakeholders can result in managers overemphasizing the greater good to the point that they ignore the reality of self-interest, particularly as it pertains to maximize shareholder wealth.

Integrating the broad categorizations of separation and ethics allows room for both self-interest of owners and corporate responsibility to non-owner stakeholders. An integrated perspective of stakeholders positions the self-interests of managers as a key driver of economic growth, but tempers this with social responsibility toward non-owner stakeholders. Maytag, for instance, found that by balancing a plant closure with adequate notice, the reputation of the firm was held intact—a benefit to owners—at the same time that competing stakeholder interests were considered. In this situation, Maytag’s Galesburg, Illinois refrigeration assembly plant announced it would be moving operations to a location with less expensive labor and other operational costs, but took the unusually move of giving the firm’s 1,000 employees, its local suppliers and the small Galesburg community two years to prepare. Maytag allowed local employment

agencies to set up job training within the Maytag plant to prepare its employees for employment after the plant closure. This illustrates how integration of multiple stakeholder interests can move beyond only self-interest or only ethics by integrating both of these.

It is overly simplistic to suggest that managers should just do the right thing in all situations, because the “right thing” to do is not always clear. On the other hand, acting solely in the financial interests of shareholders can result in unintended consequences that ultimately cause shareholders harm. Integrating multiple perspectives allows room for managers to balance the interests of multiple stakeholders. Such stakeholder perspectives allow for competing dimensions, thus provide a framework to help managers harmonize the interests of multiple parties.

SEE ALSO: Corporate Governance; Ethics; Shareholders

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STATISTICAL PROCESS CONTROL AND SIX SIGMA

SIX SIGMA

The term six sigma (6σ) originated as a performance measure or a measure of quality. Using six sigma, process goals are set in parts per million (PPM) in all areas of the production process. Since its origin, six sigma has now evolved into a methodology for improving business efficiency and effectiveness by focusing on productivity, cost reduction, and enhanced quality.

Six Sigma has its roots back with the efforts of Joseph Juran and W. Edwards Deming. Their programs for Zero Defects and Total Quality Management in Japan, lead to the adoption of the six sigma philosophy by Motorola. Motorola was able to achieve a 200-fold improvement in production quality and saved a reported \$2.2 billion using this tool. General Electric has also become the strong proponent of six sigma where it claims extensive successes. GE used six sigma during the reign of Jack Welch, where he made it the biggest corporate initiative in GE's history and received global recognition. Other users include Texas Instruments and Allied Signal. Allied took six sigma to an even higher level by incorporating it not just in production but by making it a system of leadership. Other current users include JP Morgan Chase, Sun Microsystems, American Express, and Lloyds TSB. Today, six sigma is branded as a management methodology that utilizes measures as a foundational tool for business process reengineering.

The name six sigma comes from the statistical use of the sigma (σ) symbol, which denotes standard deviations. The six identifies the number of standard deviations around the mean. Hence, six sigma says that you have to go out beyond six standard deviations around the mean before you find failure. With a high enough number of sigmas (beyond six), you would approach the point of "zero defects." For example, a move from 3σ to 4σ represents an 11-fold improvement; a move from 4σ to 5σ represents another 27-fold improvement; and a move from 5σ to 6σ represents an additional 69-fold improvement. Thus the overall improvement from 3σ to 6σ is more than 20,000-fold.

At the 3σ level, the number of defects per million totals 66,807 (or 93.3 percent accuracy). At the 4σ level the number of defects drops to 6,210 (or 99.4 percent accuracy). At the 5σ level the number of defects drops still further to 233 (or 99.97 percent accuracy). At the 6σ level the number of defects would be 3.4 per million. This equates to a 99.9997 percent accuracy. In today's world, where 98 percent or 99 percent accuracy is considered excellent, 6σ is now becoming the universally recognized standard of quality.

THE PRINCIPLES OF SIX SIGMA

A key principle of six sigma is measurement. Unfortunately that also means that if you measure the wrong things, you'll get the wrong results. For example, measuring throughput may speed up production, but at the cost of quality. Measuring quality may increase quality, but decrease customer service. So one of the toughest challenges in six sigma measurement is to identify the measurement system that will trigger the correct collection of responses.

A second key principle of measures in the six sigma environment is that all the measures should be openly visible. Openly displaying all measures on charts and graphs is a primary motivator toward the correct response.

A third principle to remember is that the change curve applies. When change happens, performance will initially go down before it recovers and goes back up. This drop in performance is often scary, but a little patience will soon see its recovery.

A principle of success or failure in the six sigma world is the requirement for cultural change or change readiness. If the organization is not primed for change, then an environment for change must be instilled prior to starting six sigma, or the project is doomed to failure. This requires training, team bonding, and team based goal setting. The resistance that exists because of a lack of understanding of what the six sigma process is attempting to achieve, can be avoided with proper training.

Six sigma concentrates on measuring and improving those outputs that are critical to the customer. The tools to accomplish this include a range of statistical methodologies that are focused on continuous improvement using a statistical thinking paradigm. This paradigm includes the following principles:

- Everything is a process.
- All processes have variations that are inherent within them.
- Data analysis is a key tool in understanding the variations in the process and in identifying improvement opportunities.

It is in the management methodology where the key, underlying benefits of six sigma can be found, which includes a problem solving and process optimization methodology. Six sigma creates a leadership vision utilizing a set of metrics and goals to improve business results by using a systematic five-phased problem solving methodology. There are two common problem solving project management methodologies that are commonly associated with six sigma. The first is DMAIC (Define, Measure, Analyze, Improve, Control), and the second is DMADV (Define, Measure,

Analyze, Design, Verify). We will discuss the most common, DMAIC.

Six sigma is a measurement-based strategy that focuses on reducing variations through monitoring and measurement tools. It is based on a philosophy that holds that every process can and should be repeatedly evaluated and significantly improved, with a focus on time required, resources, quality, cost, etc. The philosophy prepares employees with the best available problem-solving tools and methodologies using the five-phased DMAIC process. Explaining each of the steps in the process in more detail we have:

- **Define**—At the first stages of the process we look for and identify poorly performing areas of a company. We then target the projects with the best return and develop articulated problem and objective statements that have a positive financial impact on the company.
- **Measure**—At this stage we are trying to tie down the process under consideration. Where does it start and end? What should we be measuring to identify the deviation? What data characteristics are repeatable and identifiable? What is the capability of the process? We use tools like process mapping, flow charting, and FEMA (Failure Model Effects Analysis). We develop a baseline for the targeted area and implement an appropriate measurement system.
- **Analyze**—Having identified the who and what of this problem, we now target the where, when, and why of the defects in the process. We use appropriate statistical analysis tools, scatter plots, SPC and SQC, Input / Output matrixes, hypothesis testing, etc., and attempt to accurately understand what is happening in the process.
- **Improve**—At this point we should have identified the critical factors that are causing failure in the process. And, through the use of experiments, we can systematically design a corrective process that should generate the desired level of improvement. This improvement will then be monitored to assure success.
- **Control**—In the control phase we implement process control tools that can manage and monitor the process on an ongoing basis. The DMAIC process is now in full operation, but it does not stop here. The continuous monitoring of the process will not only assure the success of this change process, but it will also identify future opportunities for improvement.

Six sigma is an organization-wide strategy that develops employees and gives them the tools and capabilities to solve complex problems in a rapid fashion. Employees now have the capabilities to improve overall performance through their step-by-step improvements, always from a customer and financial perspective. Six sigma helps employees use statistical and measurement tools to deliver breakthrough results throughout the organization.

Six sigma requires full participation, from senior management to the factory floor workers. Each assumes a specific role in the six sigma process. At the top of the pecking order we find the Champions. These individuals are responsible for coordinating the business goals and objectives, which are set towards achieving the six sigma standard within the organization. They are responsible for providing the logistics and informational resources that will be needed for the successful completion of the project. They also select the project and identify the scope of the projects to be worked on. They identify the team that should work on the project, and work to remove barriers that may block the success of the project.

Most companies go on to use a classification methodology similar to the one created by Motorola to describe the abilities of their six sigma user. For example, classifications like Green Belt (part-time user) or Black Belt (full-time user) are common. Each level requires an improved mastery of the six sigma tools and skill set, as well as the roles and responsibilities of the individual in the improvement process. The objective is to create a methodology for defining the skill set of the users.

The Master Black Belt is the guru of the six sigma methodology. This individual works as a coach, leader, and teacher for the other individuals on the team. The Black Belt is the change agent for the six sigma process. This individual is a high performer and has a dedicated position that is responsible for six sigma projects. The Green Belt is a specially trained member of the team and usually sits on a function-specific part of the organization. The Green Belt works under the Black Belt on specific aspects of the six sigma projects. The Yellow Belt represents the remainder of the organization, which has been trained on some of the basic skills. These individuals are working their way towards becoming knowledgeable in the six sigma process.

Each of the successful six sigma users have customized the process to fit their own culture and methodology. In order to accomplish this, it is important to identify the key business goals and objectives of the organization, and then to adapt the six sigma methodology and philosophy to fit this goal set. We need to develop an action plan identifying how we are going to focus the six sigma tool so as to focus on the

big returns and avoid any waste in investment. Hence, it is useful to identify the areas where six sigma performs well. These include:

- Transformation of the level of customer awareness and expectation throughout all the employees of the organization.
- Improved customer-supplier relationship.
- Drives operational process improvements with savings in cost, improvements in service and productivity, and increased returns.
- Drives information flow improvements.
- Drives a deeper, organization wide understanding of the organization's operation.
- Improved sales force effectiveness.
- Introduces all employees to new tools that will enhance performance.
- Provides a vehicle for the development of a training program.

Six sigma is not an all or nothing venture. Six sigma is a collection of tools and you pick selectively from those tools in order to gain the desired result. It is also not an increase in the level of organization bureaucracy. In fact, if use properly, it will reduce the level of bureaucracy within the organization.

STATISTICAL PROCESS CONTROL

Statistical Process Control (SPC), and its companion Statistical Quality Control (SQC), are tools utilized by a six sigma process. They are not the invented creations of the Japanese or of Edward Deming. However, Ed Deming taught SPC techniques to Japanese manufacturing, and, as a result, has become the default father of the SPC process. The original objective of SPC is to provide productivity and quality information about a production process real-time. The focus was on process control and continuous improvement. The operators become their own inspectors and control their own processes.

The SPC process should collect data and report results as the process is occurring, so that immediate action can be taken. This should help a process, and its quality measures, avoid straying beyond acceptable limits and would avoid the production of bad parts. When appropriately applied, SPC can virtually eliminate the production of defective parts. Additionally, SPC creates visibility of the cause of the failure. Since an operator is able to immediately recognize that a failure is occurring, he would be able to react to that failure and observe the cause of the failure, and then take corrective action. As Peter Drucker emphasizes, the "operators become the 'owners' of not just the process, but also the parts they produce."

Because of its success, SPC has found application in other industries, including service industries, transportation industries, deliver services, and can even be found in fast food and baggage handling. For example, on-time delivery performance can be monitored on an SPC chart.

Within the SPC process there are several tools. These tools include a change management process, the collection of data, and the display of the data. In the change management process we find the use of PDCA (Plan-Do-Check-Act). The objective is to solve problems by trial and error. The process includes (P) planning a work change, (D) executing the change, (C) monitoring the effects of the change to assure that the desired results are occurring, and taking corrective (A) action in the event that the desired results are not occurring—in effect repeating the PDCA cycle. The PDCA cycle is repeated until the error is reduced to zero.

In the SPC data collection process, the objective is to collect the necessary data that will be needed to validate that a specific process is occurring correctly. The methodology for measurement is established at the point where the appropriate data is collected. Only the data that is required for the monitoring of the process is collected. An analysis of the specific reasons for collection the data is important because any additional, unnecessary data collection is considered to be a waste. The accuracy of the measurement process is also confirmed.

There are several tools available for the display of SPC data. These include:

1. Graphs and Charts are used to display trends or to summarize the data. These tend to be bar or line graphs that report on a specific parameter of performance.
2. Check Sheets or Tally Sheets are used to take the raw data and reorganize it into specific categories that are being observed.
3. Histograms or Frequency distribution charts are used to translate raw data into a pictorial display showing the performance of specific quality characteristics.
4. Pareto Principles are used to prioritize the contribution effect of specific quality problems. This tool assists in identifying which problems have the largest impact on a specific quality problem under study.
5. Brainstorming is used to generate ideas by taking advantage of the synergistic power of a team of people.
6. Ishikawa Diagrams (Fishbone Charts) are used to create problem and solution visibility by grouping problem causes into branches. Often this is referred to as a cause and effect

diagram. Using this tool in conjunction with the PDCA process helps to narrow down the root cause.

- Control Charts are used to validate that the variation of measurement of a specific parameter is kept within a set of control limits.

In SPC, the most critical part of the process is the validation that you are measuring the right thing and thereby motivating the correct response. Additionally, if one measure can take the place of several measures, then that one measure should be identified, thereby simplifying the measurement process. Once a measurement has been selected, then we are ready to set up the data collection process and to establish control charts that will monitor the performance of this data.

The control charts are built around a specific product parameter that requires monitoring because of its impact on the over-all quality of the product. The following discussion is an extremely basic overview of the SPC process, and should not be considered to be sufficient for implementing an SPC process. Rather, this discussion is simply intended to give the reader and basic overview of the process.

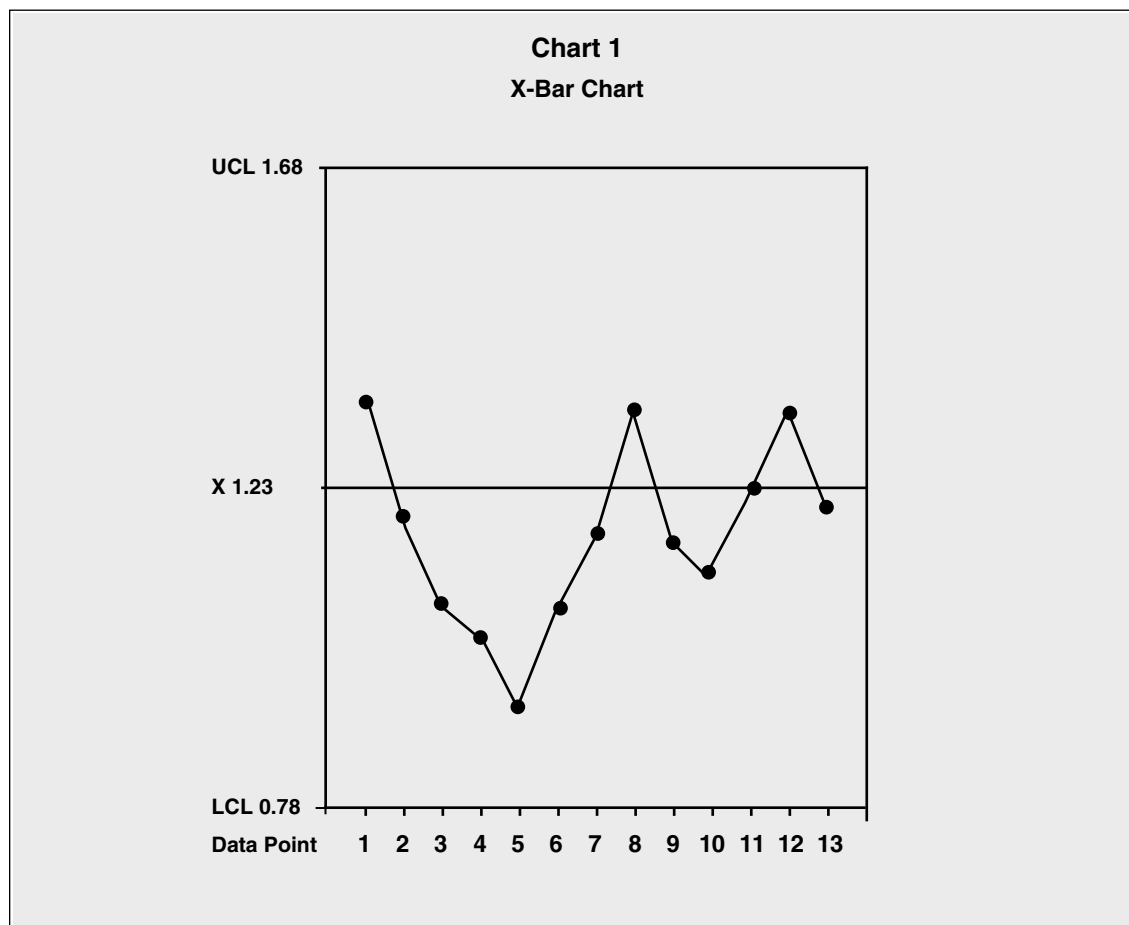
The next step in the SPC process is to establish a set of control variables that includes an average (X) and a range (R). These can be established by going to the drawings are reviewing the initial part specifications using the expected value as X and the tolerance range as R . Or, these variables can be established using historical values and calculating the historical average (X) and range (R) for the data.

Having established an X and R value, we can calculate an Upper Control Limit (UCL) and a Lower Control Limit (LCL).

$$\begin{aligned} \text{UCL} &= X + R \\ \text{LCL} &= X - R \end{aligned}$$

From these values, a pair of control charts is created. These charts are used to plot the SPC data as it occurs. They are used as a visual tool to monitor the process. Chart 1 is an example of two basic SPC charts which are monitoring a process. For these charts we will use $X=1.23$ and $R=.45$.

From Chart 1 we can see how the measurement data is recorded on the chart at the time each measurement occurs. The objectives behind this data collection process are several. One is to catch outliers in the



data (anything above the UCL or below the LCL). These outliers are quality failures and must immediately stop the process. Another purpose for the measures is to identify trends. For example data points 1 through 5 indicate a strong trend to failure approaching the LCL. Corrective action should be taken immediately to avoid the possibility of producing bad parts. Another objective can be seen in data points 7 through 13 which indicates that perhaps our LCL and UCL are too far and need to be brought in tighter, thereby giving us a higher level of performance and a higher level of quality.

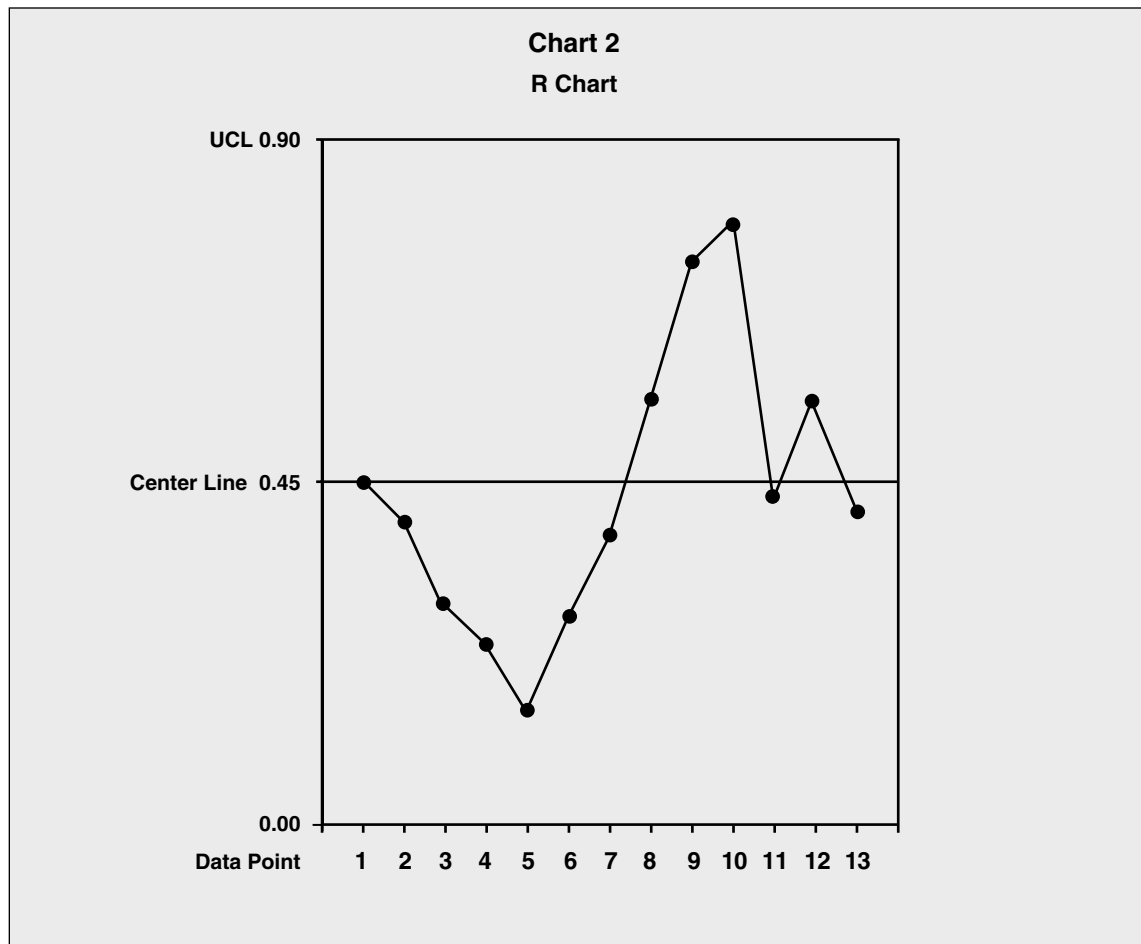
Another methodology for applying SPC processes is by collecting data, not on every event, but on a random sampling of the event. This occurs when there is a large volume of activity and the time required to measure each event is too burdensome. A statistical sample is taken, and from that sample the average of the sample data (X) and the range of that sample ($R = \text{highest} - \text{lowest measure}$) is calculated. For example, if our random sample size was 5 data points and our sample included the measures of 1.4, 1.45, 1.2, 1.3, and 1.65, then $X = 1.4$ and $R = 1.65 - 1.2 = .45$. This X value would then be the first data point plotted on Chart 1.

Using the statistical random sample, a Range chart would also need to be created. Chart 2 is an example of a range chart and the first data point of Chart would be the plot of the data corresponding to the example given. For this example, the lower limit is zero, which states that there is no deviation between each of the data points of that sample. The center point is $R (.45)$ and the UCL is equal to 2 time $R (.90)$.

In the example of the Range Chart (R Chart), the lower the value is better. A lot of vibration all over the chart suggests that the process may be going out of control. Also, a trend moving upwards as we see from data points 5 through 10 would indicate that a process is starting to go out of control and corrective action should be taken immediately.

With the X-Bar and R Charts, we can now create summarized reports, like the Histograms and Frequency Distributions that were discussed earlier. This allows a long term, summarized perspective of the process, rather than the chronological time-line that the X-Bar and R Charts offer.

There are systems and philosophies that go beyond SPC, which includes "Design of Experiments (DOE)" and "Concept Management." In DOE the



focus is on front-end design work, rather than on SPC problem solving as you go. And Concept Management utilizes Total Quality Management (TQM) methodologies to implement continuous improvement change processes, once again in an attempt to identify and resolve potential problems before they occur. Additionally, Concept Management uses Breakthrough Thinking techniques rather than Root Cause Analysis to question the cause of problems.

Six Sigma, and one of its primary tools SPC, have their roots in Japanese manufacturing process. But they have since become a key quality standard for the United States and Europe through their use of management principles and effective measurement tools.

SEE ALSO: Quality and Total Quality Management; Quality Gurus

Gerhard Plenert

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STATISTICS

Statistics is a field of knowledge that enables an investigator to derive and evaluate conclusions about a population from sample data. In other words, statistics allow us to make generalizations about a large group based on what we find in a smaller group.

The field of statistics deals with gathering, selecting, and classifying data; interpreting and analyzing data; and deriving and evaluating the validity and reliability of conclusions based on data.

Strictly speaking, the term "parameter" describes a certain aspect of a population, while a "statistic" describes a certain aspect of a sample (a representative part of the population). In common usage, most people use the word "statistic" to refer to research figures and calculations, either from information based on a sample or an entire population.

Statistics means different things to different people. To a baseball fan, statistics are information about a pitcher's earned run average or a batter's slugging percentage or home run count. To a plant manager at a distribution company, statistics are daily reports on inventory levels, absenteeism, labor efficiency, and production. To a medical researcher investigating the effects of a new drug, statistics are evidence of the success of research efforts. And to a college student, statistics are the grades made on all the exams and quizzes in a course during the semester. Today, statistics and statistical analysis are used in practically every profession, and for managers in particular, statistics have become a most valuable tool.

A set of data is a population if decisions and conclusions based on these data can be made with absolute certainty. If population data is available, the risk of arriving at incorrect decisions is completely eliminated.

But a sample is only part of the whole population. For example, statistics from the U.S. Department of Commerce suggest that as of April 2005, 10.1 percent of rental homes and apartments were vacant. However, the data used to calculate this vacancy rate was not derived from all owners of rental property, but rather only a segment ("sample" in statistical terms) of the total group (or "population") of rental property owners. A population statistic is thus a set of measured or described observations made on each elementary unit. A sample statistic, in contrast, is a measure based on a representative group taken from a population.

QUANTITATIVE AND QUALITATIVE STATISTICS

Measurable observations are called quantitative observations. Examples of measurable observations include the annual salary drawn by a BlueCross/BlueShield underwriter or the age of a graduate student in an MBA program. Both are measurable and are therefore quantitative observations.

Observations that cannot be measured are termed qualitative. Qualitative observations can only be described. Anthropologists, for instance, often use qualitative statistics to describe how one culture varies

from another. Marketing researchers have increasingly used qualitative statistical techniques to describe phenomena that are not easily measured, but can instead be described and classified into meaningful categories. Here, the distinction between a population of variates (a set of measured observations) and a population of attributes (a set of described observations) is important.

Values assumed by quantitative observations are called variates. These quantitative observations are further classified as either discrete or continuous. A discrete quantitative observation can assume only a limited number of values on a measuring scale. For example, the number of graduate students in an MBA investment class is considered discrete.

Some quantitative observations, on the other hand, can assume an infinite number of values on a measuring scale. These quantitative measures are termed continuous. How consumers feel about a particular brand is a continuous quantitative measure; the exact increments in feelings are not directly assignable to a given number. Consumers may feel more or less strongly about the taste of a hamburger, but it would be difficult to say that one consumer likes a certain hamburger twice as much as another consumer.

DESCRIPTIVE AND INFERENTIAL STATISTICS

Managers can apply some statistical technique to virtually every branch of public and private enterprise. These techniques are commonly separated into two broad categories: descriptive statistics and inferential statistics. Descriptive statistics are typically simple summary figures calculated from a set of observations. Suppose a professor computes an average grade for one accounting class. If the professor uses the statistic simply to describe the performance of that class, the result is a descriptive statistic of overall performance.

Inferential statistics are used to apply conclusions about one set of observations to reach a broader conclusion or an inference about something that has not been directly observed. In this case, a professor might use the average grade from a series of previous accounting classes to estimate, or infer, the average grade for future accounting classes. Any conclusion made about future accounting classes is based solely on the inferential statistics derived from previous accounting classes.

FREQUENCY DISTRIBUTION

Data is a collection of any number of related observations. A collection of data is called a data set. Statistical data may consist of a very large number of observations. The larger the number of observations, the greater the need to present the data in a summarized form that may omit some details, but reveals the general nature of a mass of data.

Frequency distribution allows for the compression of data into a table. The table organizes the data into classes or groups of values describing characteristics of the data. For example, students' grade distribution is one characteristic of a graduate class.

A frequency distribution shows the number of observations from the data set that fall into each category describing this characteristic. The relevant categories are defined by the user based on what he or she is trying to accomplish; in the case of grades, the categories might be each letter grade (A, B, C, etc.), pass/fail/incomplete, or grade percentage ranges. If you can determine the frequency with which values occur in each category, you can construct a frequency distribution. A relative frequency distribution presents frequencies in terms of fractions or percentages. The sum of all relative frequency distributions equals 1.00 or 100 percent.

Table 1 illustrates both a frequency distribution and a relative frequency distribution. The frequency distribution gives a break down of the number of

Table 1
Frequency Distribution for a Class of 25 M.B.A. Students

Grade Scale	Student/Grade Frequency	Relative Frequency
A	5	20%
B	12	48%
C	4	16%
D	2	8%
F	1	4%
I (Incomplete)	1	4%
TOTAL	25	100%

students in each grade category ranging from A to F, including “I” for incomplete. The relative frequency distribution takes that number and turns it into a percentage of the whole number.

The chart shows us that five out of twenty-five students, or 25 percent, received an A in the class. It is basically two different ways of analyzing the same data. This is an example of one of the advantages of statistics. The same data can be analyzed several different ways.

PARAMETERS

Decisions and conclusions can often be made with absolute certainty if a single value that describes a certain aspect of a population is determined. As noted earlier, a parameter describes an entire population, whereas a statistic describes only a sample. The following are a few of the most common types of parameter measurements used.

AGGREGATE PARAMETER. An aggregate parameter can be computed only for a population of variates. The aggregate is the sum of the values of all the variates in the population. Industry-wide sales is an example of an aggregate parameter.

PROPORTION. A proportion refers to a fraction of the population that possesses a certain property. The proportion is the parameter used most often in describing a population of attributes, for example, the percentage of employees over age fifty.

ARITHMETIC MEAN. The arithmetic mean is simply the average. It is obtained by dividing the sum of all variates in the population by the total number of variates. The arithmetic mean is used more often than the median and mode to describe the average variate in the population. It best describes the values such as the average grade of a graduate student, the average yards gained per carry by a running back, and the average calories burned during a cardiovascular workout. It also has an interesting property: the sum of the deviations of the individual variates from their arithmetic mean is always equal to zero.

MEDIAN. The median is another way of determining the “average” variate in the population. It is especially useful when the population has a particularly skewed frequency distribution; in these cases the arithmetic mean can be misleading.

To compute the median for a population of variates, the variates must be arranged first in an increasing or decreasing order. The median is the middle variate if the number of the variates is odd. For example, if you have the distribution 1, 3, 4, 8, and 9, then the median is 4 (while the mean would be 5). If the

number of variates is even, the median is the arithmetic mean of the two middle variates. In some cases (under a normal distribution) the mean and median are equal or nearly equal. However, in a skewed distribution where a few large values fall into the high end or the low end of the scale, the median describes the typical or average variate more accurately than the arithmetic mean does.

Consider a population of four people who have annual incomes of \$2,000, \$2,500, \$3,500, and \$300,000—an extremely skewed distribution. If we looked only at the arithmetic mean (\$77,000), we would conclude that it is a fairly wealthy population on average. By contrast, in observing the median income (\$3,000) we would conclude that it is overall a quite poor population, and one with great income disparity. In this example the median provides a much more accurate view of what is “average” in this population because the single income of \$300,000 does not accurately reflect the majority of the sample.

MODE. The mode is the most frequently appearing variate or attribute in a population. For example, say a class of thirty students is surveyed about their ages. The resulting frequency distribution shows us that ten students are 18 years old, sixteen students are 19 years old, and four are 20 or older. The mode for this group would be the sixteen students who are 19 years old. In other words, the category with the most students is age 19.

MEASURE OF VARIATION

Another pair of parameters, the *range* and the *standard deviation*, measures the disparity among values of the various variates comprising the population. These parameters, called measures of variation, are designed to indicate the degree of uniformity among the variates.

The range is simply the difference between the highest and lowest variate. So, in a population with incomes ranging from \$15,000 to \$45,000, the range is \$30,000 ($\$45,000 - \$15,000 = \$30,000$).

The standard deviation is an important measure of variation because it lends itself to further statistical analysis and treatment. It measures the average amount by which variates are spread around the mean. The standard deviation is a versatile tool based on yet another calculation called the variance. The variance for a population reflects how far data points are from the mean, but the variance itself is typically used to calculate other statistics rather than for direct interpretation, such as the standard deviation, which is more useful in making sense of the data.

The standard deviation is a simple but powerful adaptation of the variance. It is found simply by taking the square root of the variance. The resulting figure

can be used for a variety of analyses. For example, under a normal distribution, a distance of two standard deviations from the mean encompasses approximately 95 percent of the population, and three standard deviations cover 99.7 percent.

Thus, assuming a normal distribution, if a factory produces bolts with a mean length of 7 centimeters (2.8 inches) and the standard deviation is determined to be 0.5 centimeters (0.2 inches), we would know that 95 percent of the bolts fall between 6 centimeters (2.4 inches) and 8 centimeters (3.1 inches) long, and that 99.7 percent of the bolts are between 5.5 centimeters (2.2 inches) and 8.5 centimeters (3.3 inches). This information could be compared to the product specification tolerances to determine what proportion of the output meets quality control standards.

PROBABILITY

Modern statistics may be regarded as an application of the theory of probability. A set is a collection of well-defined objects called elements of the set. The set may contain a limited or infinite number of elements. The set that consists of all elements in a population is referred to as the universal set.

Statistical experiments are those that contain two significant characteristics. One is that each experiment has several possible outcomes that can be specified in advance. The second is that we are uncertain about the outcome of each experiment. Examples of statistical experiments include rolling a die and tossing a coin. The set that consists of all possible outcomes of an experiment is called a sample space, and each element of the sample space is called a sample point.

Each sample point or outcome of an experiment is assigned a weight that measures the likelihood of its occurrence. This weight is called the probability of the sample point.

Probability is the chance that something will happen. In assigning weights or probabilities to the various sample points, two rules generally apply. The first is that probability assigned to any sample point ranges from 0 to 1. Assigning a probability of 0 means that something can never happen; a probability of 1 indicates that something will always happen. The second rule is that the sum of probabilities assigned to all sample points in the sample space must be equal to 1 (e.g., in a coin flip, the probabilities are .5 for heads and .5 for tails).

In probability theory, an event is one or more of the possible outcomes of doing something. If we toss a coin several times, each toss is an event. The activity that produces such as event is referred to in probability theory as an experiment. Events are said to be mutually exclusive if one, and only one, can take

place at a time. When a list of the possible events that can result from an experiment includes every possible outcome; the list is said to be collectively exhaustive. The coin toss experiment is a good example of collective exhaustion. The end result is either a head or a tail.

There are a few theoretical approaches to probability. Two common ones are the classical approach and the relative frequency approach. Classical probability defines the probability that an event will occur as the number of outcomes favorable to the occurrence of the event divided by the total number of possible outcomes. This approach is not practical to apply in managerial situations because it makes assumptions that are unrealistic for many real-life applications. It assumes away situations that are very unlikely, but that could conceivably happen. It is like saying that when a coin is flipped ten times, there will always be exactly five heads and five tails. But how many times do you think that actually happens? Classical probability concludes that it happens every time.

The relative frequency approach is used in the insurance industry. The approach, often called the relative frequency of occurrence, defines probability as the observed relative frequency of an event in a very large number of trials, or the proportion of times that an event occurs in the long run when conditions are stable. It uses past occurrences to help predict future probabilities that the occurrences will happen again.

Actuaries use high-level mathematical and statistical calculations in order to help determine the risk that some people and some groups might pose to the insurance carrier. They perform these operations in order to get a better idea of how and when situations that would cause customers to file claims and cost the company money might occur. The value of this is that it gives the insurance company an estimate of how much to charge for insurance premiums. For example, customers who smoke cigarettes are in higher risk group than those who do not smoke. The insurance company charges higher premiums to smokers to make up for the added risk.

SAMPLING

The objective of sampling is to select that part which is representative of the entire population. Sample designs are classified into probability samples and nonprobability samples. A sample is a probability sample if each unit in the population is given some chance of being selected. The probability of selecting each unit must be known. With a probability sample, the risk of incorrect decisions and conclusions can be measured using the theory of probability.

A sample is a non-probability sample when some units in the population are not given any chance of

being selected, and when the probability of selecting any unit into the sample cannot be determined or is not known. For this reason, there is no means of measuring the risk of making erroneous conclusions derived from non-probability samples. Since the reliability of the results of non-probability samples cannot be measured, such samples do not lend themselves to statistical treatment and analysis. Convenience and judgment samples are the most common types of non-probability samples.

Among its many other applications, sampling is used in some manufacturing and distributing settings as a means of quality control. For example, a sample of 5 percent may be inspected for quality from a pre-determined number of units of a product. That sample, if drawn properly, should indicate the total percentage of quality problems for the entire population, within a known margin of error (e.g., an inspector may be able to say with 95 percent certainty that the product defect rate is 4 percent, plus or minus 1 percent).

In many companies, if the defect rate is too high, then the processes and machinery are checked for errors. When the errors are found to be human errors, then a statistical standard is usually set for the acceptable error percentage for laborers.

In sum, samples provide estimates of what we would discover if we knew everything about an entire population. By taking only a representative sample of the population and using appropriate statistical techniques, we can infer certain things, not with absolute precision, but certainly within specified levels of precision.

SEE ALSO: Data Processing and Data Management; Forecasting; Models and Modeling; Planning

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Revised by Scott Droege

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STRATEGIC ALLIANCES

SEE: Joint Ventures and Strategic Alliances

STRATEGIC PARTNERSHIPS

SEE: Government-University-Industry Partnerships

STRATEGIC PLANNING FAILURE

Strategic management is the process of defining the purpose and pursuits of an organization and the methods for achieving them. Robert Grant emphasizes that competition provides the rationale for strategy because strategy is about winning. It follows then that the inter-dependence of competitors is the essence of strategy—actions of individual competitors and teams of competitors affect outcomes for other participants. In other words, organizational leaders must “play the game” strategically because their organizations are involved in a game of strategy (e.g., chess) not simply a game of chance (e.g., bingo) or a game of skill (e.g., tennis). Of course, the necessary skills must exist, and at times things will happen that were not predictable. However, each organization must have a strategic focus if it intends to survive and flourish in the long term.

The overall strategic management model can be broken into two major phases: strategy development and strategy deployment. Strategy development is the creation and establishment of an organization’s overall mission and vision and the means to achieve them. Strategic development includes the following elements of the strategic management model:

- Mission—Why does the organization exist?
- Internal and External Assessments—What are the internal strengths and weaknesses and external threats and opportunities?
- Vision—Where does the organization want to be in the future?
- Goals and Objectives—What are the overall, high-level desired results as well as specific, measurable outcomes required to achieve the mission and vision?
- Strategy Formulation—What is the plan of how and when to achieve the goals and objectives? This includes strategies, tactics, and action plans (Who will do what and when?)

Strategy deployment, or implementation, is the translation of strategic plans into actions and results. It is the execution of the strategic plan at all levels in the organization. Development and deployment are considered separately because the best strategic plans will have no impact if not implemented well. Conversely, simple strategic plans that are deployed well can have major impact. The strategy deployment phase includes the following elements of the model:

- Strategy Implementation—execution or deployment of the strategic plans.

- Measurement and Feedback—the monitoring and feedback element answers the questions “How is the organization doing?” “What modifications and improvements are necessary?”

Other elements of strategic management that are required for strategic planning to be successful are:

- Core Competencies—What are our best capabilities?
- Distinctive Competencies —Which of our competencies are unique and not easily replicated?
- Core Values—What do we care about as an organization? What are our shared values?
- Critical Success Factors—What do we have to do right to be successful?
- Leadership Competencies—What leadership characteristics and competencies do we require of our managers and non-managers?

RECENT HISTORY OF STRATEGIC PLANNING

In the 1960s and 1970s, strategic planning was viewed by executives as the best way to ensure productivity and profits. The assumption was that everything that was of potential value to decision making and strategic planning could be measured, and that after subjecting those measurements to various quantitative models, results would show executives the best strategies.

In the early 1960s, professors Ken Andrews and C. Roland Christensen of the Harvard Business School contended that strategy could be a potentially powerful tool for linking business functions and assessing a company’s weaknesses and strengths in relationship to its competitors’ strengths and weaknesses. General Electric emerged as a pioneer in the area of corporate strategic planning and developed a high-powered staff of full-time strategic planners to direct GE’s planning efforts. With the assistance of McKinsey and Company, GE was organized into strategic business units (SBUs) and strategic plans were developed for each SBU.

In 1963, the Boston Consulting Group pioneered a variety of strategic approaches that became popular with executives. Two of BCG’s approaches were the “experience curve” and the “growth and market-share matrix.” The trust of executives in strategic planning models increased throughout the 1970s, and perhaps peaked with the publication of “Competitive Strategy,” by Harvard professor Michael E. Porter in 1980. Porter’s books and articles continue to have a tremendous

influence on many executives, university students, and professors.

By the early 1980s, some executives began to feel that the return on their investment in the development of large strategic planning departments had been a disappointment. Also, the increase in computer technology and globalization of industries caused increased complexity in those industries, and the strategic models of the 1960s and 1970s could not deal with the complex dynamics of the new marketplace.

The death knell for strategic planning began when General Electric chairman Jack Welch significantly downsized the GE operating units’ planning departments. Many other executives followed Welch’s example during the 1980s and 1990s. Strategic planning was replaced in the minds of executives with thoughts of improving quality and productivity through operational innovation. The most prominent of these approaches included total quality management (TQM) and the Quality philosophies of Deming, Juran, and Crosby. In the 1990s, corporations began to focus on process reengineering and downsizing as a way of increasing operational effectiveness even more. Process Reengineering, an idea authors Hammer and Champy espoused was accepted by many as an additional strategy toward increased productivity.

In the 1990s, strategic planning was reborn. New approaches for strategy focused on growth through mergers/acquisitions and joint ventures, generation of innovative ideas through decentralized strategic efforts within the company, emergent strategy, and the leveraging of core competencies to create strategic intent.

The dominant theme for organizations in the twenty-first century is strategic and organizational innovation, and issues include reconciling size with flexibility and responsiveness. New alliances mean cooperative strategies, complexity, changes in commitments of corporate social responsibility, etc. Today’s strategic planning requires new models of leadership, less formal structures, and more commitment to self direction. Also, past strategic failures relating to ethical problems require renewed commitments to ethical standards. Strategic management has evolved from the 1950s when its theme was budgetary planning and control to the twenty-first century when its theme is strategic and organizational innovation. See Table 1.

WHY DID TRADITIONAL STRATEGIC MANAGEMENT/STRATEGIC PLANNING FAIL?

Sydney Finkelstein maps four circumstances in which strategic planning failure is most likely to occur: launching new ventures, promoting innovation and change, managing mergers and acquisitions and

Table 1
The Evolution of Strategic Management/Strategic Planning

Period	1950's	1960's and Early 1970's	Late 1970's and early 1980's	Late 1980's and early 1990's	2000+
Dominant Theme	Budgetary planning & control.	Corporate planning.	Strategic Positioning. Analysis of industry & competition.	Strategic competitive advantage.	Strategic and organizational innovation.
Main Focus and Issues	Financial control, especially through operating budgets.	Planning growth, especially diversification and Portfolio Planning.	Selecting industries and markets. Positioning for market leadership.	Focusing strategy around Sources of competitive advantage. Dynamic aspects of strategy.	Reconciling size with flexibility & responsiveness.
Principal Concepts & Techniques	Financial budgeting. Investment planning. Project appraisal.	Medium- and long-term forecasting. Corporate planning techniques. Synergy.	Industry Analysis. Competitor analysis. Segmentation. Experience curves. PIMS analysis. SBU's (Strategic Business Units). Portfolio Planning.	Resources and capabilities. Shareholder value. Knowledge management. Information Technology. Analysis of speed, responsiveness & first-mover advantage.	Cooperative strategies. Competing for standards. Complexity & self-organization. Corporate social responsibility. Renewed commitment to ethics.
Organizational Implications	Systems of operational and capital budgeting become key mechanisms of coordination and control.	Creation of corporate planning departments & long-term planning processes. Mergers & acquisitions.	Multidivisional & multinational structures. Greater industry & market selectivity. Divestment of unattractive business units.	Restructuring. Continuous improvement & process reengineering. Refocusing. Outsourcing. E-business.	Alliances and networks. New models of leadership. Informal structures. Less reliance on direction, more on emergence.

Adapted from: Robert M. Grant, Contemporary Strategy Analysis, 5th and 2nd eds., Blackwell Publishers, Inc., Cambridge, Massachusetts, 2005 and 1995.

responding to new environmental pressures. So in this era of dramatic change, global alliances, and a variety of environmental pressures, the potential for failure is very real.

Henry Mintzberg believes that the strategic planning models of the 1960s and 1970s ultimately failed because they did not distinguish between strategic planning and strategic thinking. Traditional strategic planning models were heavily oriented to quantitative analysis, the results of which directed the executive towards what strategy should be taken. These planning models actually subverted strategic thinking that involves the synthesis of one's experience, intuition, and creativity, in addition to analysis. Traditional

strategic planning was not useless, but it should have been done after strategic thinking and vision development had taken place.

Another problem with traditional strategic planning was that it did not include in the planning process those who had to implement the strategic plan. The strategic planning was done at the very top of the organization, or by expert consultants, and the strategic plan was handed down to managers in bound, published documents. People often felt less than committed to such plans, and the documents themselves often did not take into account the actual business challenges these managers faced on a day-to-day basis. At lower levels in the hierarchy, the problem was even more

severe because planning was often used to exercise blatant control over people.

Mintzberg notes that another reason traditional strategic planning failed was because it was based on some fundamental flaws: (1) the fallacy of prediction; (2) the fallacy of detachment; and (3) the fallacy of formalization.

THE FALLACY OF PREDICTION. Traditional strategic planning was based on the assumption that one could measure all of the variables that were relevant to the future of a business, analyze the results, and construct strategies based upon the results that, if followed, would ensure future success. However, even the best strategies experience unforeseen economic, industry, social, and market shifts. The fallacy of prediction inevitably led to the downfall of traditional strategic planning, because the strategies could not deliver what they promised: predictable success.

THE FALLACY OF DETACHMENT. Traditional strategic planning assumed that it was better to be detached from the workers and from middle managers when analyzing data, in order to prevent bias in the planning process. However, this simply separated the strategy makers from the strategy implementers, which turned out to be a fatal mistake. When problems of implementation arose, both sides pointed fingers at each other as the cause for the failure. Additionally, traditional strategic planning was often based on inappropriately aggregated data, data that was no longer current, or data that did not have important contextual information linked to it. Also strategic planners often ignored qualitative data, thus creating huge blind spots in the final strategic plan.

THE FALLACY OF FORMALIZATION. This fallacy is based on the notion that formal systems are superior to human systems in terms of information processing and decision making. Mintzberg believes that though formal systems might be able to process larger amounts of data than humans can, formal systems cannot integrate, synthesize, or create new directions from such analyses—only humans can perform the latter processes. We think in order to act, but we also act in order to think. Our experiments that work converge gradually into viable strategies.

THE ICARUS PARADOX

Danny Miller offers another perspective as to why strategies often fail. In his landmark study, Miller investigated the decline of powerful corporations, and his findings have done much to help managers understand the causes of strategic and organizational failure.

Miller named the model he developed from his findings, the *Icarus Paradox* after the tragic figure

from Greek mythology. Icarus's father, Daedalus, was an inventor, who was asked to build a labyrinth for King Minos. Upon completion of his task, King Minos would not allow Daedalus to leave. Determined to escape, Daedalus built wings for himself and his son, Icarus, by adhering the wings of birds onto long boards with wax. Icarus was fascinated with the invention and was eager to try flying. Daedalus taught Icarus how to fly using his invention, but cautioned Icarus to fly only at a moderate height—neither too low nor too high. The escape was a success, but Icarus, ignoring the advice of his father, began gaining confidence in his ability to fly and grew more daring. He ultimately flew too high—too close to the sun—and the heat from the sun caused the wax to melt. His wings disintegrated and he plummeted helplessly to his death. The paradox of Icarus was that his skill and technology, which led him to freedom, ultimately also led to his death.

Miller found in his research that the victories and strengths of companies can often be the cause of their future strategic failure. Miller delineated four major causes of strategic failure: leadership traps, monolithic cultures and skills, power and politics, and structural memories. All of these causes emerge while an organization is experiencing success—especially in its strategic initiatives.

LEADERSHIP TRAPS. Success can be a trap in and of itself. Miller found that consistent success tends to reinforce leaders' world views and ties them rigidly to the strategies and processes that brought about past successes. This causes, in turn, these same leaders to become:

- overconfident
- prone to excess and neglect
- prone to shape strategies based on their preferences rather than what data, changing business circumstances, customers, and technological shifts dictate
- conceited—true believers in the adulation heaped upon them by the press, subordinates, shareholders, and other admirers
- obstinate—prone to resent challenges to their way of thinking
- isolated from the reality of the marketplace

The impact of those tendencies on strategy making is very negative when strategy is developed from ego, preconceptions of what causes success, stubbornness, and old, worn conceptual models.

MONOLITHIC CULTURES AND SKILLS AND POWER AND POLITICS. Miller found that another reason for strategic failure in organizations that have been successful is due to the fact that these organizations tend to rely on

“star” departments and the culture that builds up around them. When certain functions take precedence over others in an imbalanced manner, other business functions are seen as less important, and perhaps even unimportant, to the success of the organization. Over time, the evolution of organizational cultures in successful companies usually becomes monolithic, intolerant, and focused on a single goal or very limited goals. Additionally, the star department attracts the best and the brightest managers away from other departments, so that the organization has an imbalance of managerial talent throughout the organization. Conversely, talented managers in departments outside the star department usually join companies that can appreciate their skills. Over time, managerial talent is diluted (excepted for within the star department) and becomes imbalanced throughout the organization. The “star” departments have more power, and people in these departments are able to use their power to play politics and gain even more resources and success.

POWER AND POLITICS. As managers in the star departments increase their power, they become less inclined to adjust the way they have always conducted business. Programs, policies, and practices that in the past, have proven successful and given these managers such high status are loyally adhered to, and the ability to make organizational adjustments becomes limited. The ultimate consequence of this type of power build-up in a company is that past strategies are perpetuated, often without a careful evaluation of their current effectiveness.

STRUCTURAL MEMORIES. Past successful strategies engender policies, routines, systems, and programs in a company, and the institutionalization of these processes within a company creates a powerful organizational culture. Miller notes that “the more established and successful the strategy, the more deeply imbedded it will be in such programs, and the more it will be implemented routinely, automatically, and unquestioningly. Managers will rely on ingrained habits and reflex actions rather than deliberating and reflecting on new problems.” In these situations, the past fashions how one sees the present, and is a powerful force for continually choosing the same, or similar, strategic courses of action, both within the organization and outside the organization.

DISRUPTIVE TECHNOLOGIES AS A CAUSE OF STRATEGIC FAILURE

Clayton M. Christensen, in his book *The Innovator's Dilemma* reported research findings that suggest that even when companies do follow sound management practices they still are exposed to events and problems that can cause strategic failure.

The innovator's dilemma is that “the logical, competent decisions of management that are critical to the success of their companies are also the reasons why they lose their positions of leadership.” He contends that good management involves sustaining the success of products and processes, and that companies are generally good at this. However, such companies can be blind sided by the emergence of disruptive technologies. These disruptive technologies are products or processes that appear in the marketplace, but that look harmless to the successful company.

In the short term, they do not seem to pose much of threat, and thus they are ignored. However, over time, disruptive technologies can become a powerful force, and that when they do, successful companies are not organized or prepared to respond to what essentially is a new competitor in the market. Examples of disruptive technologies are the small, off-road motorcycles that were introduced by Japanese manufacturers into the United States. Over time, they threatened the product lines of Harley-Davidson and BMW. Health maintenance organizations (HMOs) strategically hurt traditional health insurers, and transistors killed the vacuum tube industry.

Successful companies miss seeing the threat of disruptive technologies because they are essentially caught in the routine of maintaining the status quo, i.e., their current success. To spot future disruptive technologies and plan for combat against them, a company would need to invest resources in the scanning for, and development of, disruptive technologies; be willing to enter into the market when a potentially disruptive technology emerges; be adept at developing new ways of analyzing emerging markets; and be aware that improving their product, and increasing its price, creates vacuums at the lower price range for emerging technologies to enter. The goal is to be able to both sustain successful products and processes, yet at the same time be able to see, evaluate, and develop disruptive technologies.

Strategic planning often fails for a variety of reasons such as:

1. Failure of merging organizations to understand either or both complementary competencies and synergies as well as areas that are not complementary and synergistic.
2. Failure to understand the culture of the organization.
3. Failure to adequately execute the strategic plans.
4. Failure to function as a team at the executive level or other levels.
5. Failure to develop values and culture to support the plans.

6. Failure to expeditiously do what is needed to be done.
7. Failure to trust and support each other at the various levels of the organization
8. Failure to prevent ethical and legal problems.

EXAMPLES OF STRATEGIC PLANNING FAILURE

HEWLETT PACKARD. CEO Carly Fiorina positioned HP as perhaps the widest-ranging technology company in the world, with offerings from digital cameras, to printers, to supercomputers. She staked her career on HP's acquisition of Compaq in 2002, and she lost. She was fired on February 7, 2005. The acquisition had been bitterly opposed by major shareholders including Walter Hewlett. Under Fiorina's direction, HP unsuccessfully battled IBM, Dell, Sony, EMC, and others. Today, the \$80 billion HP is struggling in everything except its stellar printing business.

For months, Wall Street analysts have argued that HP's pieces/divisions would be worth far separately than they are together as a company. Fiorina fiercely resisting breaking up HP, and the Board of Directors insists that it will keep HP intact. HP has problems in enterprise computing. It is losing ground to EMC Corp. in storage and to Dell and IBM in servers. So much more is needed than simply replacing one or more top executives. How much HP energy was lost as Walter Hewlett and numerous employees and shareholders fought Fiorina's vision? How much more was lost as Hewlett was pushed off the board of the company his father founded? Fiorina was a decisive, gifted communicator. However, she fired or lost many executives, and she rigorously resisted changing strategies even as she made dramatic changes. She merged HP's 80-plus autonomous business units into a more centralized, four-division giant and eventually laid off thousands of workers. She had to also battle two cultures, HP and Compaq, both of which were very reluctant to change.

Why did the strategic planning based on the company vision fail? It was difficult for HP executives to rapidly understand complementary and non-complementary competencies, strategies, and synergies as well as differences in the respective cultures. From the outside, it would appear that most of the failure can be traced lack of trust and support among the players—the board members, some members of the board and Fiorina, the employees and the company, the shareholders and the board, and the shareholders and Fiorina. Also, Fiorina never had the loyalty of the employees. Some insist say it was failure of Fiorina to execute her ambitious strategic plan, and that is the reason she was fired. One *Business Week* article says Fiorina broke three key rules that CEO's must follow:

place the company's well-being above all else, including yourself; know your company from the inside out—some say that Fiorina did not fully comprehend the impact on operations of her vision to transform HP's structure and strategy; and hold people accountable, including yourself. Only history will tell whether HP will spin-off divisions or remain the one-stop shop that Carly Fiorina envisioned.

XEROX. The Xerox Board of Directors suddenly promoted Anne Mulcahy to president in May, 2000, after ousting G. Richard Thoman, who lasted thirteen months, and reinstalling Chairman Paul A. Allaire as CEO. The company was floundering after years of weak sales and high costs. Employees and customers were disgruntled. Then in October, Xerox reported its first quarterly loss in sixteen years. Debt was piling up, and the Securities & Exchange Commission began investigating whether Xerox used accounting tricks to boost income. Insiders and those outside of Xerox felt that Mulcahy had the strategic mind and toughness to serve as CEO. On July 26, 2004, Mulcahy was named CEO of Xerox. When Anne Mulcahy took over as CEO, Xerox was in terrible shape. It was fighting the Securities and Exchange Commission over accounting practices. It was \$14 billion in debt, and bankruptcy was a real possibility. She was relentless in her efforts to stabilize Xerox. She made dramatic staff and business cuts. She brought in a new CFO. She met with numerous customers. Also, she got her people focused on turnaround and growth, which she says is the job of leadership.

What caused strategic plans prior to Mulcahy to fail? Six former senior executives of Xerox settled an SEC enforcement action charging them with fraud and agreed to pay over \$22 Million in penalties, disgorgement and interest. Specific charges included securities fraud and aiding and abetting Xerox's violations of the reporting, books and records and internal control provisions of the federal securities laws. In other words, instead of relying on strategic plans to work (or changing the strategic plans) Xerox's senior management had apparently substituted accounting manipulations for the company's actual operational performance. Certainly there was a failure to develop values and culture to support the strategic plans, and there were legal and ethical problems related to the lack of appropriate shared core values. Apparently the strategic plans were also not appropriate, or they had not been fully executed since both customers and employees were unhappy, sales were weak, and costs were high.

SEE ALSO: Strategic Planning Tools; Strategy Formulation; Strategy Implementation; Strategy in the Global Environment; Strategy Levels

Mark E. Mendenhall
Revised by Mildred Golden Pryor

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STRATEGIC PLANNING TOOLS

Strategic planning may be characterized as a systematic effort to produce fundamental decisions and actions that shape and guide what a business organization is, what it does, and why it does it. The objective of strategic planning is to develop a map by which to manage an organization's positioning.

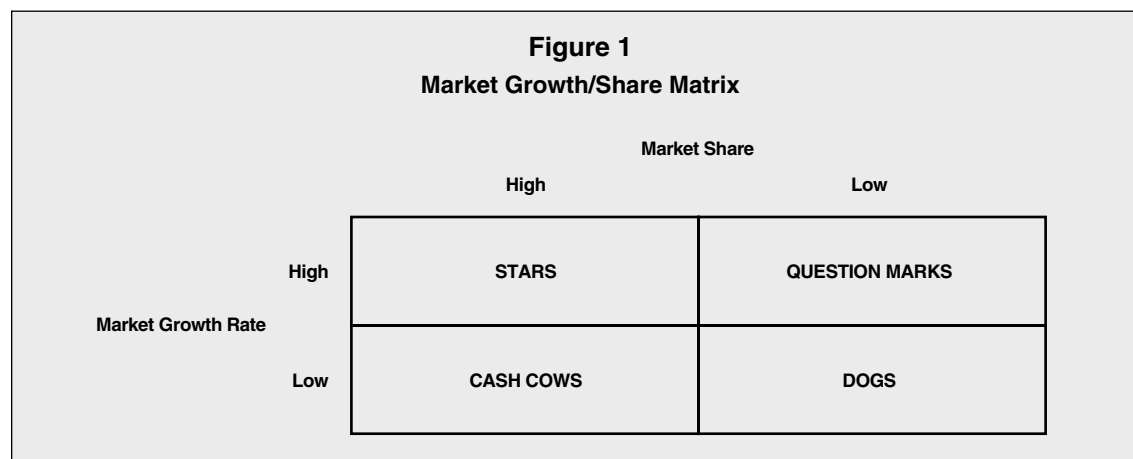
Although some would suggest that strategic planning has lost some of its effectiveness, most managers continue to recognize the need for effective strategic planning and implementation. While strategic planning requires a significant amount of time and can be quite frustrating, if done properly, it can enable a firm to recognize its most effective position within its industry.

There are a variety of perspectives, models and approaches used in strategic planning. The development and implementation of these different tools depend on a large number of factors, such as size of the organization, nature and complexity of the organization's environment, and the organization's leadership and culture.

Five strategic planning tools are presented below: the Boston Consulting Group Matrix; the GE Market Growth/Market Share Matrix; SWOT Analysis; Porter's Generic Competitive Strategies; and Porter's Five Forces Model.

BOSTON CONSULTING GROUP MATRIX

In the late 1960s the Boston Consulting Group, a leading management consulting company, designed a four-cell matrix known as BCG Growth/Share Matrix. This tool was developed to aid companies in the measurement of all their company businesses according to relative market share and market growth. The BCG Matrix made a significant contribution to strategic management and continues to be an important strategic tool used by companies today. The matrix provides a composite picture of the strategic position of each separate business within a company so that the management can determine the strengths and the needs of



all sectors of the firm. The development of the matrix requires the assessment of a business portfolio, which includes an organization's autonomous divisions (activities, or profit centers).

The BCG Matrix presents graphically the differences among these business units in terms of relative market share and industry growth rate. The vertical axis represents in a linear scale the growth rate of the market in which the business exists (see Figure 1). This is generally viewed as the expected growth rate for the next five years of the market in which a particular business competes. The values of the vertical axis are the relevant market growth rates (i.e., 5 percent, 10 percent, 15 percent, 20 percent, etc.). Usually a 10 percent cut-off level is selected in order to distinguish high from low market growth rate (a 10 percent value corresponds to doubling current experience in the next five to seven years).

The horizontal axis represents in a logarithmic scale the market share of a business within a firm relative to the market share of the largest competitor in the market. For example, Company A may have a 10 percent market share and Company B, the leading competitor, holds 40 percent of the market. Company A's market share relative to Company B's market share is 25 percent, or .25 \times . If Company A has a 40 percent share and Company B has a 10 percent share, Company A's market share is 400 percent, or 4.0 \times .

Relative market share is an indicator of organization's competitive position within the industry, and underlies the concept of experience curve. Thus, business organizations with high relative market share tend to have a cost leadership position.

Each of a company's products or business units is plotted on the matrix and classified as one of four types: question marks, stars, cash cows, and dogs. Question marks, located in the upper-right quadrant, have low relative market share in a high-growth market. These businesses are appropriately called

question marks because it is often uncertain what will happen to them. Careful examination by management can help determine how many resources (if any) should be invested in these businesses. If significant change can increase relative market share for a question mark, it can become a star and eventually gain cash-cow status. If relative market share can not be increased, the question mark becomes a dog.

The upper-left quadrant contains stars, businesses with high relative market share in high-growth markets. These businesses are very important to the company because they generate a high level of sales and are quite profitable. However, because they are in a high growth market that is very attractive to competitors, they require a lot of resources and investments to maintain a high market share. Often the cash generated by stars must be reinvested in the products in order to maintain market share.

When the market growth slows down, stars can take different paths, depending on their abilities to hold (or gain) market share or to lose market share. If a star holds or gains market share when the growth rate slows, stars become more valuable over time, or cash cows. However, if a star loses market share, it becomes a dog and has significantly less value (if any) to the company.

The lower-left quadrant contains businesses that have high relative market share in low-growth markets. These businesses are called cash cows and are highly profitable leaders in their industries. The funds received from cash cows are often used to help other businesses within the company, to allow the company to purchase other businesses, or to return dividends to stockholders.

Dogs generate low relative market share in a low-growth market. They generate little cash and frequently result in losses. Management should carefully consider their reasons for maintaining dogs. If there is a loyal consumer group to which these businesses

appeal, and if the businesses yield relatively consistent cash that can cover their expenses, management may choose to continue their existence. However, if a dog consumes more resources than it's worth, it will likely be deleted or divested.

Strategic business units, which are often used to describe the products grouping or activities, are represented with a circle in the BCG Matrix. The size of the circle indicates the relative significance of each business unit to the organization in terms of revenue generated (or assets used).

Although the BCG Matrix is not used as often as it was in past years, one big advantage of the matrix is its ability to provide a comprehensive snapshot of the positions of a company's various business concerns. Furthermore, an important benefit of the BCG Matrix is that it draws attention to the cash flow, investment characteristics, and needs of an organization's business units, helping organizations to maintain a balanced portfolio.

Unfortunately, the BCG Matrix, like all analytical techniques, also has some important limitations. It has been criticized for being too simplistic in its use of growth rate and market share. Market growth rate is only one variable in market attractiveness and market share is only one variable in a business's competitive position. Furthermore, viewing every business as a star, cash flow, dog, or question mark is not always realistic. A four-cell matrix is too simple because strategic competitive positions are more complicated than "high" and "low".

Another disadvantage of using the BCG Matrix is that it is often difficult for a company to sufficiently divide its business units or product lines. Consequently, it is difficult to determine market share for the various units of concern.

GENERAL ELECTRIC MATRIX

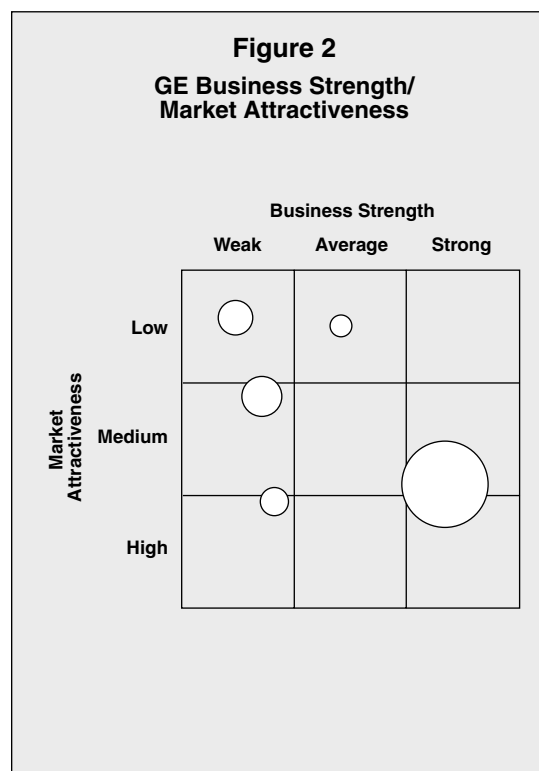
In the 1980s General Electric, along with the McKinsey and Company Consulting group, developed a more involved method for analyzing a company's portfolio of businesses or product lines. This nine-cell matrix considers the attractiveness of the market situation and the strength of the particular business of interest. These two dimensions allow a company to use much more data in determining each business unit's position.

The key to the successful implementation of this strategic tool is the identification and measurement of the appropriate factors that define market attractiveness and business strength. Those individuals involved in strategic planning are responsible for determining the factors. The attractiveness of the market may be based on such factors as market growth rate, barriers

to entry, barriers to exit, industry profitability, power of the suppliers and customers, availability of substitutes, negotiating power of both customers and members of the channel of distribution, as well as other opportunities and threats.

The strength of a particular business may be based on such factors as market-share position, cost placement in the industry, brand equity, technological position, and other possible strengths and weaknesses. The development of General Electric (GE) Matrix requires assessing the criteria to evaluate both industry attractiveness and business strength. The calculation of scores for these dimensions is frequently based on a simple weighted sum formula.

To consider this approach as a matrix analysis, market attractiveness is placed on the vertical axis with the possible values of low, medium, and high (see Figure 2). Business strength is placed on the horizontal axis with the possible values of weak, average, and strong. A circle on the matrix represents each business unit (or product line). The size (area) of each circle represents the size of the relevant market in terms of sales. A portion of the circle is shaded to represent the market share of each business unit or product line within the market.



The nine cells of this matrix define three general zones of consideration for the strategic manager. According to this approach, the first zone contains businesses that are the best investments. These are units high in market attractiveness and strong in business

strength, followed by those that are strong in business strength and medium in market attractiveness, and those that are medium in business strength and high in market attractiveness. Management should pursue investment and growth strategies for these units. Management should be very careful in determining the appropriate strategy for those business units located in any of the three cells in the diagonal of this matrix.

The second zone includes those business units that have moderate overall attractiveness and those units that have medium business strength and market attractiveness, weak business strength and high market attractiveness, and strong business strength and low market attractiveness. These businesses should be managed according to their relative strengths and the company's ability to build on those strengths. Moreover, possible changes in market attractiveness should be carefully considered.

Those businesses that fall in the last zone are low in overall attractiveness; these are a good investment only if additional resources can move the business from a low overall attractiveness position to a moderate or strong overall attractiveness position. If not, these businesses should be considered for deletion or harvest.

The GE Matrix may be considered as an improvement over the BCG Matrix. The major advantage of using this matrix design is that both a business' strength and an industry's attractiveness are considered in the company's decision. Generally, it considers much more information than BCG Matrix, it involves the judgments of the strategic decision-makers, and it focuses on competitive position.

A major disadvantage, however, is the difficulty in appropriately defining business strength and market attractiveness. Also, the estimation of these dimensions is a subjective judgment that may become quite complicated. Another disadvantage lies in the lack of objective measures available to position a company; managers making these strategic decisions may have difficulty determining their unit's proper placement. Too, some argue that the GE Matrix cannot effectively depict the positions of new products or business units in developing industries.

SWOT ANALYSIS MATRIX

One of the most widely used strategic planning tools is a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis. Most companies use, in one form or another, SWOT analysis as a basic guide for strategic planning. The worth of a SWOT analysis is often dependent on the objective insight of those management individuals who conduct the SWOT analysis. If management (or consultant management) is able to provide objective, relevant information for the analysis, the results are extremely useful for the company.

A SWOT analysis involves a company's assessment of its internal position by identifying the company's strengths and weaknesses. In addition, the company must determine its external position by defining its opportunities and threats.

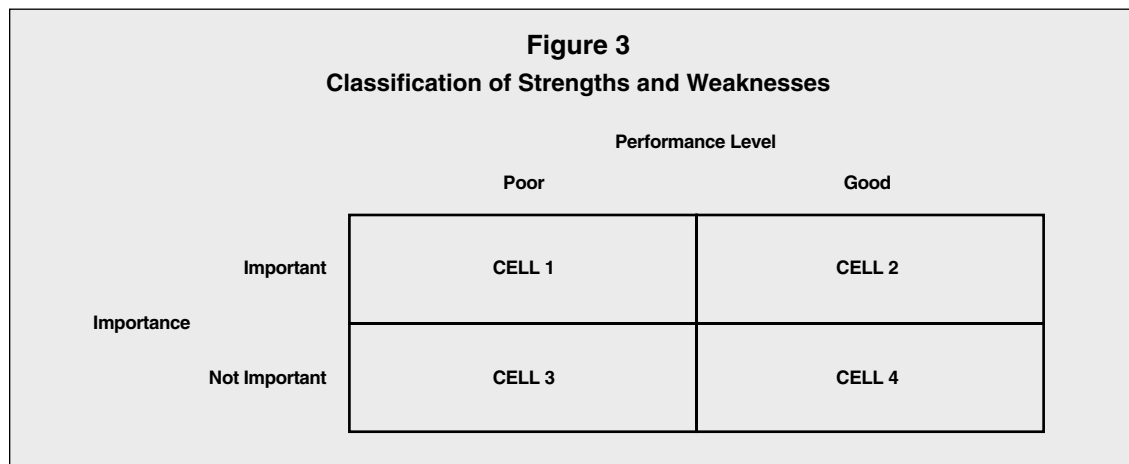
Strengths represent those skills in which a company exceeds and/or the key assets of the firm. Examples of strengths are a group of highly skilled employees, cutting-edge technology, and high-quality products. Weaknesses are those areas in which a firm does not perform well; examples include continued conflict between functional areas, high production costs, and a poor financial position.

Opportunities are those current or future circumstances in the environment that might provide favorable conditions for the firm. Examples of opportunities include an increase in the market population, a decrease in competition and a legislation that is favorable to the industry. Threats are those current or future circumstances in the environment, which might provide unfavorable conditions for the firm. Examples of threats include increased supplier costs, a competitor's new product-development process, and a legislation that is unfavorable to the industry.

After a firm has identified its strengths and weaknesses, it should determine the significance of each factor. A management team should review all strengths and weaknesses to determine the level (minor or major) of each strength and weakness. The importance (low or high) of each strength and weakness should also be identified. As shown in Figure 3, the combination of level of performance and importance yields four possibilities.

Cell 1 contains important areas in which the company is exhibiting poor performance. When a company identifies these areas it becomes aware of the need to improve its efforts in order to strengthen its performance. Important areas in which the company is performing very well are located in Cell 2. A company should continue its current efforts in these areas. Cell 3 contains unimportant areas in which the firm is performing poorly. Since these areas are a low priority for the company, it need not pay a great deal of attention to these areas. The last category, Cell 4, includes areas in which the company is performing well, but which are unimportant. The firm may need to pull back some of its efforts in this area, depending on how unimportant the area is to the overall picture.

In order to be most effectively used, opportunities and threats must also be classified. One way to examine opportunities is to consider how attractive (low or high) an opportunity is to a particular company. A business might also consider its probability of success (low or high) in utilizing a particular opportunity. A company doesn't need to pursue an opportunity that is not particularly attractive to it, nor does it need to pursue an opportunity for which it does not possess the requisite



strengths. Threats should be evaluated according to their seriousness (low or high) and their probability of occurrence (low or high). A company must pay much more attention to a very serious threat that is quite likely to occur, than to a mild threat that is unlikely to occur.

Careful determination and classification of a company's strengths, weaknesses, opportunities, and threats provides an excellent way for a company to analyze its current and future situation. It is not necessary for a company to take advantage of all opportunities, nor is it necessary for a company to develop methods to deal with all threats. Additionally, a company need not strengthen all of its weaknesses or be too smug about all its strengths. All of these factors should be evaluated in the context of each other in order to provide the company with the most useful planning information.

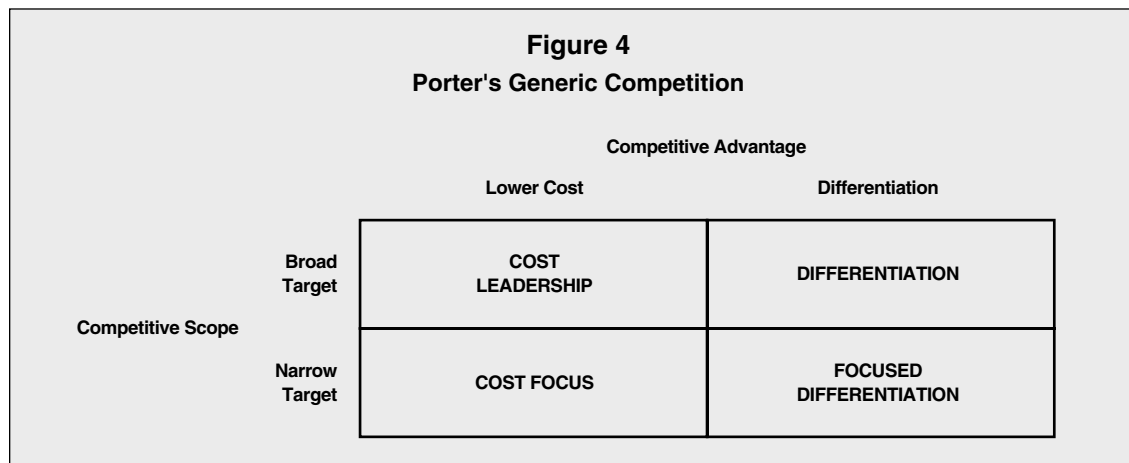
PORTER'S GENERIC COMPETITIVE STRATEGIES

Michael Porter has suggested a method of categorizing the various types of competitive strategies. He identified two generic competitive strategies: overall

lower cost and differentiation. These strategies are termed generic because they can be applied to any size or form of business. Overall lower cost refers to companies that can develop, manufacture, and distribute products more efficiently than their competitors. Differentiation refers to companies that are able to provide superior products based on some factor other than low cost. Differentiation can be based on customer service, product quality, unique style, and so on.

Porter also suggests that another factor affecting a company's competitive position is its competitive scope. Competitive scope defines the breadth of a company's target market. A company can have a broad (mass market) competitive scope or a narrow (niche market) competitive scope. The combination of broad scope and narrow scope with a low-cost strategy and differentiation results in the following generic competitive strategies: cost leadership, cost focus, differentiation, and focused differentiation (see Figure 4).

The implementation of these strategies requires different organizational arrangements and control processes. Larger firms with greater access to resources typically select a cost leadership or a differentiation



strategy, whereas smaller firms often compete on a focus basis.

Cost leadership is a low-cost, broad-based market strategy. Firms pursuing this type of strategy must be particularly efficient in engineering tasks, production operations, and physical distribution. Because these firms focus on a large market, they must also be able to minimize costs in marketing and R&D. A low-cost leader can gain significant market share enabling it to procure a more powerful position relative to both suppliers and competitors. This strategy is particularly effective in case of price-sensitive buyers in the market and small possibilities to achieve product differentiation.

A cost-focus strategy is a low-cost, narrowly focused market strategy. Firms employing this strategy may focus on a particular buyer segment or a particular geographic segment, and must locate a niche market that wants or needs an efficient product and is willing to do without the extras in order to pay a lower price for the product. A company's costs can be reduced by providing little or no service, providing a low-cost method of distribution, or producing a no-frills product.

A differentiation strategy involves marketing a unique product to a broad-based market. Because this type of strategy involves a unique product, price is not the significant factor. In fact, consumers may be willing to pay a high price for a product that they perceive as different. The product difference may be based on product design, method of distribution, or any aspect of the product (other than price) that is significant to a broad market group of consumers. A company choosing this strategy must develop and maintain a product that is perceived as different enough from the competitor's products to warrant the asking price.

Effective implementation of a differentiation strategy requires an analytical study of customer needs and preferences in order to offer a unique product. This usually helps business organizations to achieve customer loyalty, which can also serve as an entry barrier for new firms. Several studies have shown that a differentiation strategy is more likely to generate higher profits than a cost-leadership strategy, because differentiation creates stronger entry barriers. However, a cost-leadership strategy is more likely to generate increases in market share.

A differentiation-focus strategy is the marketing of a differentiated product to a narrow market, often involving a unique product and a unique market. This strategy is viable for a company that can convince consumers that its narrow focus allows it to provide better goods and services than its competitors.

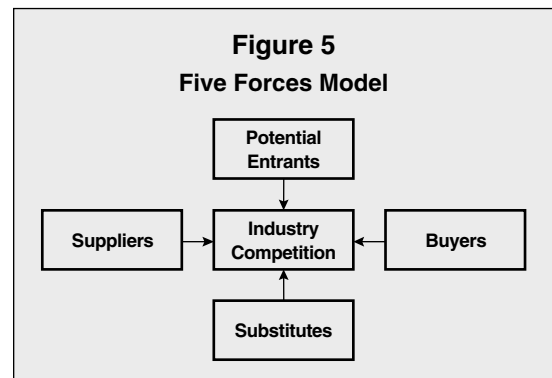
None of these competitive strategies is guaranteed to achieve success, and some companies that have successfully implemented one of Porter's generic

strategies have found that they could not sustain the strategy. Several risks associated with these strategies are based on evolved market conditions (buyer perceptions, competitors, etc).

Recent researchers argue that both cost-leadership and differentiation strategies can be simultaneously achieved. The principal condition for this situation is superior quality, which may lead to increased customer commitment on the one hand, and minimized quality costs (through learning effects, economies of scale, etc.) on the other.

PORTER'S FIVE-FORCES MODEL

Before a company enters a market or market segment, the competitive nature of the market or segment is evaluated. Porter suggests that five forces collectively determine the intensity of competition in an industry: threat of potential entrants, threat of potential substitutes, bargaining power of suppliers, bargaining power of buyers, and rivalry of existing firms in the industry. By using the model shown in Figure 5, a firm can identify the existence and importance of the five competitive forces, as well as the effect of each force on the firm's success.



The threat of new entrants deals with the ease or difficulty with which new companies can enter an industry. When a new company enters an industry, the competitive climate changes; there is new capacity, more competition for market share, and the addition of new resources. Entry barriers and exit barriers affect the entrance of new companies into a marketplace. If entry barriers (capital requirements, economies of scale, product differentiation, switching costs, access to distribution channels, cost of promotion and advertising, etc.) are high, a company is less likely to enter a market. The same holds true for exit barriers.

The threat of substitutes affects competition in an industry by placing an artificial ceiling on the prices companies within an industry can charge. A substitute product is one that can satisfy consumer needs also

targeted by another product; for example, lemonade can be substituted for a soft drink. Generally, competitive pressures arising from substitute products increase as the relative price of substitute products declines and as consumer's switching costs decrease.

The bargaining power of buyers is affected by the concentration and number of consumers, the differentiation of products, the potential switching costs, and the potential of buyers to integrate backwards. If buyers have strong bargaining power in the exchange relationship, competition can be affected in several ways. Powerful buyers can bargain for lower prices, better product distribution, higher-quality products, as well as other factors that can create greater competition among companies.

Similarly, the bargaining power of suppliers affects the intensity of competition in an industry, especially when there is a large number of suppliers, limited substitute raw materials, or increased switching costs. The bargaining power of suppliers is important to industry competition because suppliers can also affect the quality of exchange relationships. Competition may become more intense as powerful suppliers raise prices, reduce services, or reduce the quality of goods or services.

Competition is also affected by the rivalry among existing firms, which is usually considered as the most powerful of the five competitive forces. In most industries, business organizations are mutually dependent. A competitive move by one firm can be expected to have a noticeable effect on its competitors, and thus, may cause retaliation or counter-efforts (e.g. lowering prices, enhancing quality, adding features, providing services, extending warranties, and increasing advertising).

The nature of competition is often affected by a variety of factors, such as the size and number of competitors, demand changes for the industry's products, the specificity of assets within the industry, the presence of strong exit barriers, and the variety of competitors.

Recently, several researchers have proposed a sixth force that should be added to Porter's list in order to include a variety of stakeholder groups from the task environment that wield over industry activities. These groups include governments, local communities, creditors, trade associations, special interest groups, and shareholders.

The implementation of strategic planning tools serves a variety of purposes in firms, including the clear definition of an organization's purpose and mission, and the establishment of a standard base from which progress can be measured and future actions can be planned. Furthermore, the strategic planning tools should communicate those goals and objectives to the organization's constituents. Thus, the worth of

these tools, as well as others, is often dependent on the objective insight of those who participate in the planning process. It is also important for those individuals who will implement the strategies to play a role in the strategic-planning process; this often requires a team effort that should allow a variety of inputs and should result in a better overall understanding of the company's current and future industry position.

SEE ALSO: Generic Competitive Strategies; Porter's 5-Forces Model; Strategic Planning Failure; Strategy Formulation; Strategy Implementation; Strategy in the Global Environment; Strategy Levels; SWOT Analysis

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STRATEGY FORMULATION

Stated simply, strategy is a road map or guide by which an organization moves from a current state of affairs to a future desired state. It is not only a template by which daily decisions are made, but also a tool with which long-range future plans and courses of action are constructed. Strategy allows a company to position itself effectively within its environment to reach its maximum potential, while constantly monitoring that environment for changes that can affect it so as to make changes in its strategic plan accordingly.

In short, strategy defines where you are, where you are going, and how you are going to get there.

HISTORY

Strategic planning, as a formalized business process, has been in practice for almost 40 years. However, it is commonplace to find that a grand majority of organizations have no clear concept of how to effectively conduct the planning process. As a result, most strategic plans are poorly conceived and do nothing more than sit on a bookshelf; no real impact is ever made on the company and its activities. Fortunately, within the past decade or so, there have been attempts made to clarify the major components and processes of strategic planning. In this respect, it has become easier for ordinary an organization to effectively create and implement a first rate strategic plan.

STRATEGY FORMULATION

Basic strategic planning is comprised of several components that build upon the previous piece of the plan, and operates much like a flow chart. However, prior to embarking on this process, it is important to consider the players involved. There must be a commitment from the highest office in the organizational hierarchy. Without buy-in from the head of a company, it is unlikely that other members will be supportive in the planning and eventual implementation process, thereby dooming the plan before it ever takes shape. Commitment and support of the strategic-planning initiative must spread from the president and/or CEO all the way down through the ranks to the line worker on the factory floor.

Just as importantly, the strategic-planning team should be composed of top-level managers who are capable of representing the interests, concerns, and

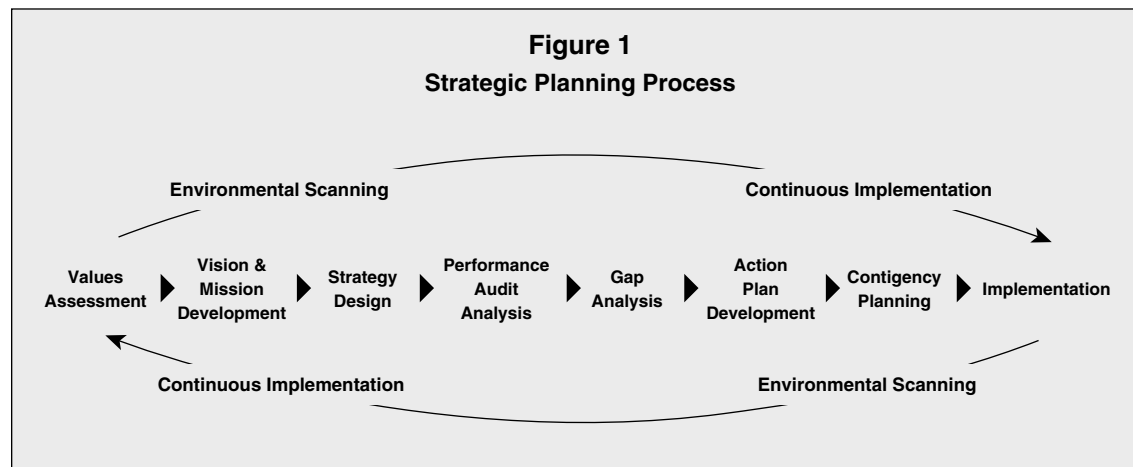
opinions of all members of the organization. As well, organizational theory dictates that there should be no more than twelve members of the team. This allows group dynamics to function at their optimal level.

The components of the strategic-planning process read much like a laundry list, with one exception: each piece of the process must be kept in its sequential order since each part builds upon the previous one. This is where the similarity to a flow chart is most evident, as can be seen in the following illustration.

The only exceptions to this are environmental scanning and continuous implementation, which are continuous processes throughout. This article will now focus on the discussion of each component of the formulation process: environmental scanning, continuous implementation, values assessment, vision and mission formulation, strategy design, performance audit analysis, gap analysis, action-plan development, contingency planning, and final implementation. After that, this article will discuss a Japanese variation to Strategy Formulation, Hoshin Planning, which has become very popular.

ENVIRONMENTAL SCANNING

This element of strategy formulation is one of the two continuous processes. Consistently scanning its surroundings serves the distinct purpose of allowing a company to survey a variety of constituents that affect its performance, and which are necessary in order to conduct subsequent pieces of the planning process. There are several specific areas that should be considered, including the overall environment, the specific industry itself, competition, and the internal environment of the firm. The resulting consequence of regular inspection of the environment is that an organization readily notes changes and is able to adapt its strategy accordingly. This leads to the development of a real advantage in the form of accurate responses to internal



and external stimuli so as to keep pace with the competition.

CONTINUOUS IMPLEMENTATION

The idea behind this continual process is that each step of the planning process requires some degree of implementation before the next stage can begin. This naturally dictates that all implementation cannot be postponed until completion of the plan, but must be initiated along the way. Implementation procedures specific to each phase of planning must be completed during that phase in order for the next stage to be started.

VALUES ASSESSMENT

All business decisions are fundamentally based on some set of values, whether they are personal or organizational values. The implication here is that since the strategic plan is to be used as a guide for daily decision making, the plan itself should be aligned with those personal and organizational values. To delve even further, a values assessment should include an in-depth analysis of several elements: personal values, organizational values, operating philosophy, organization culture, and stakeholders. This allows the planning team to take a macro look at the organization and how it functions as a whole.

Strategic planning that does not integrate a values assessment into the process is sure to encounter severe implementation and functionality problems if not outright failure. Briefly put, form follows function; the form of the strategic plan must follow the functionality of the organization, which is a direct result of organizational values and culture. If any party feels that his or her values have been neglected, he or she will not adopt the plan into daily work procedures and the benefits will not be obtained.

VISION AND MISSION FORMULATION

This step of the planning process is critical in that it serves as the foundation upon which the remainder of the plan is built. A vision is a statement that identifies where an organization wants to be at some point in the future. It functions to provide a company with directionality, stress management, justification and quantification of resources, enhancement of professional growth, motivation, standards, and succession planning. Porrus and Collins (1996) point out that a well-conceived vision consists of two major components: a core ideology and the envisioned future.

A core ideology is the enduring character of an organization; it provides the glue that holds an organi-

zation together. It itself is composed of core values and a core purpose. The core purpose is the organization's entire reason for being. The envisioned future involves a conception of the organization at a specified future date inclusive of its aspirations and ambitions. It includes the BHAG (big, hairy, audacious goal), which a company typically reaches only 50 to 70 percent of the time. This envisioned future gives vividly describes specific goals for the organization to reach.

The strategic results of a well formulated vision include the survival of the organization, the focus on productive effort, vitality through the alignment of the individual employees and the organization as a whole, and, finally, success. Once an agreed-upon vision is implemented, it is time to move on to the creation of a mission statement.

An explicit mission statement ensures the unanimity of purpose, provides the basis for resource allocation, guides organizational climate and culture, establishes organizational boundaries, facilitates accountability, and facilitates control of cost, time, and performance. When formulating a mission statement, it is vital that it specifies six specific elements, including the basic product or service, employee orientation, primary market(s), customer orientation, principle technologies, and standards of quality. With all of these elements incorporated, a mission statement should still remain short and memorable. For example, the mission statement of the American Red Cross, reads:

“The mission of the American Red Cross is to improve the quality of human life; to enhance self-reliance and concern for others; and to help people avoid, prepare for, and cope with emergencies.”

Other functions of a mission statement include setting the bounds for development of company philosophy, values, aspirations, and priorities (policy); establishing a positive public image; justifying business operations; and providing a corporate identity for internal and external stakeholders.

STRATEGY DESIGN

This section of strategy formulation involves the preliminary layout of the detailed paths by which the company plans to fulfill its mission and vision. This step involves four major elements: identification of the major lines of business (LOBs), establishment of critical success indicators (CSIs), identification of strategic thrusts to pursue, and the determination of the necessary culture.

A line of business is an activity that produces either dramatically different products or services or that are geared towards very different markets. When considering the addition of a new line of business, it

should be based on existing core competencies of the organization, its potential contribution to the bottom line, and its fit with the firm's value system.

The establishment of critical success factors must be completed for the organization as a whole as well as for each line of business. A critical success indicator is a gauge by which to measure the progress toward achieving the company's mission. In order to serve as a motivational tool, critical success indicators must be accompanied by a target year (i.e. 1999, 1999–2002, etc.). This also allows for easy tracking of the indicated targets. These indicators are typically a mixture of financial figures and ratios (i.e. return on investment, return on equity, profit margins, etc.) and softer indicators such as customer loyalty, employee retention/turnover, and so on.

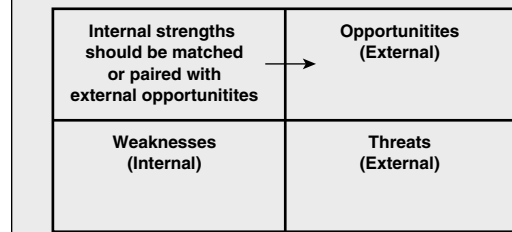
Strategic thrusts are the most well-known methods for accomplishing the mission of an organization. Generally speaking, there are a handful of commonly used strategic thrusts, which have been so aptly named *grand strategies*. They include the concentration on existing products or services; market/product development; concentration on innovation/technology; vertical/horizontal integration; the development of joint ventures; diversification; retrenchment/turnaround (usually through cost reduction); and divestment/liquidation (known as the final solution).

Finally, in designing strategy, it is necessary to determine the necessary culture with which to support the achievement of the lines of business, critical success indicators, and strategic thrusts. Harrison and Stokes (1992) defined four major types of organizational cultures: power orientation, role orientation, achievement orientation, and support orientation. Power orientation is based on the inequality of access to resources, and leadership is based on strength from those individuals who control the organization from the top. Role orientation carefully defines the roles and duties of each member of the organization; it is a bureaucracy. The achievement orientation aligns people with a common vision or purpose. It uses the mission to attract and release the personal energy of organizational members in the pursuit of common goals. With a support orientation, the organizational climate is based on mutual trust between the individual and the organization. More emphasis is placed on people being valued more as human beings rather than employees. Typically an organization will choose some mixture of these or other predefined culture roles that it feels is suitable in helping it to achieve its mission and the other components of strategy design.

PERFORMANCE AUDIT ANALYSIS

Conducting a performance audit allows the organization to take inventory of what its current state is. The main idea of this stage of planning is to take an

Figure 2
SWOT Analysis



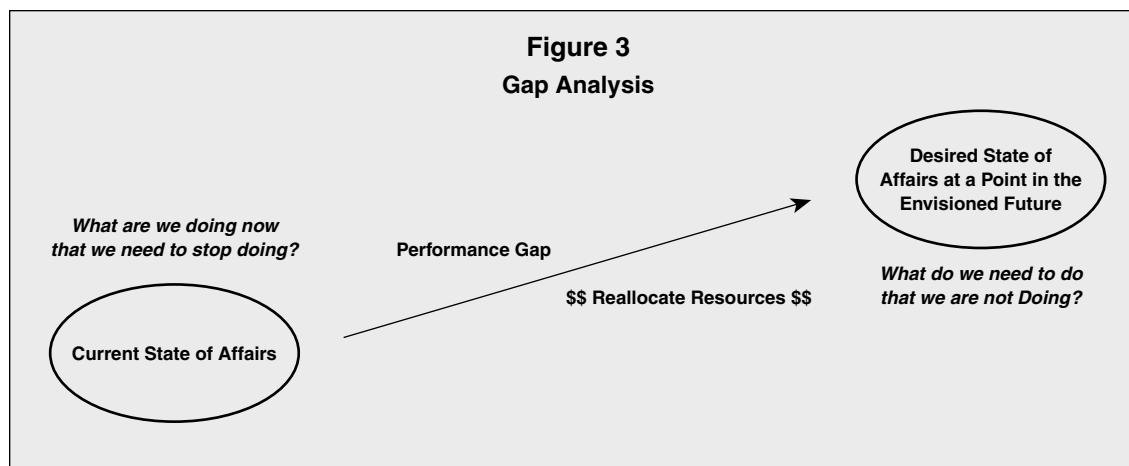
in-depth look at the company's internal strengths and weaknesses and its external opportunities and threats. This is commonly called a SWOT analysis.

Developing a clear understanding of resource strengths and weaknesses, an organization's best opportunities, and its external threats allows the planning team to draw conclusions about how to best allocate resources in light of the firm's internal and external situation. This also produces strategic thinking about how to best strengthen the organization's resource base for the future.

Looking internally, there are several key areas that must be analyzed and addressed. This includes identifying the status of each existing line of business and unused resources for prospective additions; identifying the status of current tracking systems; defining the organization's strategic profile; listing the available resources for implementing the strategic thrusts that have been selected for achieving the newly defined mission; and an examining the current organizational culture. The external investigation should look closely at competitors, suppliers, markets and customers, economic trends, labor-market conditions, and governmental regulations. In conducting this query, the information gained and used must reflect a current state of affairs as well as directions for the future. The result of a performance audit should be the establishment of a performance gap, that is, the resultant gap between the current performance of the organization in relation to its performance targets. To close this gap, the planning team must conduct what is known as a gap analysis, the next step in the strategic planning process.

GAP ANALYSIS

A gap analysis is a simple tool by which the planning team can identify methods with which to close the identified performance gap(s). All too often, however, planning teams make the mistake of making this step much more difficult than need be. Simply, the planning team must look at the current state of affairs



and the desired future state. The first question that must be addressed is whether or not the gap can feasibly be closed. If so, there are two simple questions to answer: “What are we doing now that we need to stop doing?” and “What do we need to do that we are not doing?” In answering these questions and reallocating resources from activities to be ceased to activities to be started, the performance gap is closed. If there is doubt that the initial gap cannot be closed, then the feasibility of the desired future state must be reassessed.

ACTION PLAN DEVELOPMENT

This phase of planning ties everything together. First, an action plan must be developed for each line of business, both existing and proposed. It is here that the goals and objectives for the organization are developed.

Goals are statements of desired future end-states. They are derived from the vision and mission statements and are consistent with organizational culture, ethics, and the law. Goals are action oriented, measurable, standard setting, and time bounded. In strategic planning, it is essential to concentrate on only two or three goals rather than a great many. The idea is that a planning team can do a better job on a few rather than on many. There should never be more than seven goals. Ideally, the team should set one, well-defined goal for each line of business.

Writing goals statements is often a tricky task. By following an easy-to-use formula, goals will include all vital components.

- Accomplishment/target (e.g., to be number one in sales on the East Coast by 2005)
- A measure (e.g., sales on the East Coast)
- Standards (e.g., number one)
- Time frame (e.g., long-term)

Objectives are near-term goals that link each long-term goal with functional areas, such as operations, human resources, finance, etc., and to key processes such as information, leadership, etc. Specifically, each objective statement must indicate what is to be done, what will be measured, the expected standards for the measure, and a time frame less than one year (usually tied to the budget cycle). Objectives are dynamic in that they can and do change if the measurements indicate that progress toward the accomplishment of the goal at hand is deficient in any manner. Simply, objectives spell out the step-by-step sequences of actions necessary to achieve the related goals.

With a thorough understanding of how these particular elements fit and work together, an action plan is developed. If carefully and exactly completed, it will serve as the implementation tool for each established goal and its corresponding objectives as well as a gauge for the standards of their completion.

CONTINGENCY PLANNING

The key to contingency planning is to establish a reactionary plan for high impact events that cannot necessarily be anticipated. Contingency plans should identify a number of key indicators that will create awareness of the need to reevaluate the applicability and effectiveness of the strategy currently being followed. When a red flag is raised, there should either be a higher level of monitoring established or immediate action should be taken.

IMPLEMENTATION

Implementation of the strategic plan is the final step for putting it to work for an organization. To be successful, the strategic plan must have the support of every member of the firm. As mentioned in the beginning, this is why the top office must be involved from

the beginning. A company's leader is its most influential member. Positive reception and implementation of the strategic plan into daily activities by this office greatly increases the likelihood that others will do the same.

Advertising is key to successful implementation of the strategic plan. The more often employees hear about the plan, its elements, and ways to measure its success, the greater the possibility that they will undertake it as part of their daily work lives. It is especially important that employees are aware of the measurement systems and that significant achievements be rewarded and celebrated. This positive reinforcement increases support of the plan and belief in its possibilities.

HOSHIN PLANNING

Hoshin planning, or "hoshin kanri" in Japanese, is a planning method developed in Japan during the 1970s and adopted by some U.S. firms starting in the 1980s. Also known in the United States as policy deployment, management by policy, and hoshin management, it is a careful and deliberate process by which the few most important organizational goals are deployed throughout the organization. It consists of five major steps:

1. Development at the executive level of a long-term vision.
2. Selection of a small number of annual targets that will move the organization toward the vision.
3. Development of plans at all levels of the organization that will together achieve the annual targets.
4. Execution of the plans.
5. Regular audits of the plans. Among U.S. companies that utilize this method are Hewlett-Packard and Xerox.

HISTORY OF HOSHIN PLANNING

The literal meaning of "hoshin kanri" is helpful in understanding its use "hoshin" is made up of two characters that mean "needle" and "pointing direction," together meaning something like a compass "kanri" also is made up of two characters that mean "control" or "channeling" and "reason" or "logic." Together they mean managing the direction of the company, which is vitally important especially in times of rapid change.

Hoshin management was developed in Japan as part of the overall refinement of quality programs in that country after World War II. At one time, "made in Japan" was synonymous with shoddy quality, but with

the encouragement of the American occupation force, the Japanese Union of Scientists and Engineers (JUSE) made great efforts to improve Japanese manufacturing. An important element of the JUSE program between 1950 and 1960 was inviting W. Edwards Deming and Joseph M. Juran to train managers and scholars in statistical process control (SPC) and quality management. So significant were these visits, especially Deming's, that the highest Japanese award for quality is called the Deming Prize. Each company developed its own planning methodology, but the Deming Prize system involves the sharing of best practices, and common themes developed. In 1965 Bridgestone Tire published a report described the planning techniques used by Deming Prize winners, which were given the name hoshin kanri. By 1975 hoshin planning was widely accepted in Japan.

In the early 1980s hoshin planning began to gain acceptance in the United States, first in companies that had divisions or subsidiaries in Japan which won the Deming Prize: Yokagawa Hewlett-Packard, Fuji Xerox, and Texas Instruments' Oita plant. Florida Power and Light, the only company outside Japan to win the Deming Prize, was an early adopter. During the 1990s the practice spread. In 1994 Noriaki Kano, professor of management science at the University of Tokyo and member of the Deming Prize Committee, gave a presentation on the topic at the meeting of the American Society of Quality Control (now the American Society for Quality).

THE CONTEXT FOR HOSHIN PLANNING

Hoshin planning should be seen in the context of total quality management (TQM). Several elements of TQM are especially important for the effectiveness of hoshin planning. Most basic is a customer-driven master plan that encapsulates the company's overall vision and direction. Hoshin planning also assumes an effective system of daily management that keeps the company moving on course, including an appropriate business structure and the use of quality tools such as SPC. A third important element of TQM is the presence of cross-functional teams. Experience in problem solving and communications across and between levels of the organization are vital for hoshin planning.

A number of general principles underlie this method. Of utmost importance is participation by all managers in defining the vision for the company as well as in implementing the plans developed to reach the vision. Related to this is what the Japanese call "catchball," which means a process of lateral and vertical communication that continues until understanding and agreement is assured. Another principle is individual initiative and responsibility. Each manager sets his own monthly and yearly targets and then integrates them with others. Related to this principle is a

focus on the process rather than strictly on reaching the target and a dedication to root cause analysis. A final principle that is applied in Japan-but apparently not in the United States-is that when applying hoshin planning, there is no tie to performance reviews or other personnel measures.

STEPS OF POLICY DEPLOYMENT

In its simplest form, hoshin planning consists of a plan, execution, and audit. In a more elaborated form it includes a long-range plan (five to ten years), a detailed one-year plan, deployment to departments, execution, and regular diagnostic audits, including an annual audit by the CEO.

FIVE- TO TEN-YEAR VISION. The long-range vision begins with the top executive and his staff, but is modified with input from all managers. The purpose is to determine where the company wants to be at that future point in time, given its current position, its strengths and weaknesses, the voice of the customer, and other aspects of the business environment in which it operates. Beyond stating the goal, this long-range plan also identifies the steps that must be taken to reach it. It focuses on the vital few strategic gaps that must be closed over the time period being planned.

Once the plan has been drafted, it is sent to all managers for their review and critique. The object is to get many perspectives on the plan. The review process also has the effect of increasing buy-in to the final plan. This process is easier in Japanese companies than in most U.S. firms because most Japanese companies have only four layers of management.

ANNUAL PLAN. Once the long-range vision is in place, the annual plan is created. The vital few areas for change that were identified in the vision are translated into steps to be taken this year. Again, this process involves lateral and vertical communication among managers. The targets are selected using criteria such as feasibility and contribution to the long-term goals. The targets are stated in simple terms with clearly measurable goals. Some companies and authors refer to such an annual target as a hoshin. Most companies set no more than three such targets, but others establish as many as eight. Not all departments are necessarily involved in every hoshin during a given year. The targets are chosen for the sake of the long-term goals, not for involvement for its own sake.

DEPLOYMENT TO LOWER LEVELS. Once the targets, including the basic metrics for each, are established, the plan is deployed throughout the company. This is the heart of hoshin planning. Each hoshin has some sort of measurable target. Top-level managers, having discussed it with their subordinates earlier in the process, commit to a specific contribution to that

target, and then their subordinates develop their own plans to reach that contribution, including appropriate metrics. Plans are deployed to lower levels in the same way (see Figure 1). An important principle here is that those who have to implement the plan design the plan. In addition to the lower level targets, the means and resources required are determined. Catchball plays an important role here. A key element of the hoshin discipline is the horizontal and vertical alignment of the many separate plans that are developed. All ambiguities are clarified, and conflicting targets or means are negotiated.

The final step in deploying the hoshin is rolling up the separate plans and targets to ensure that they are sufficient to reach the company-wide target. If not, more work is done to reconcile the difference.

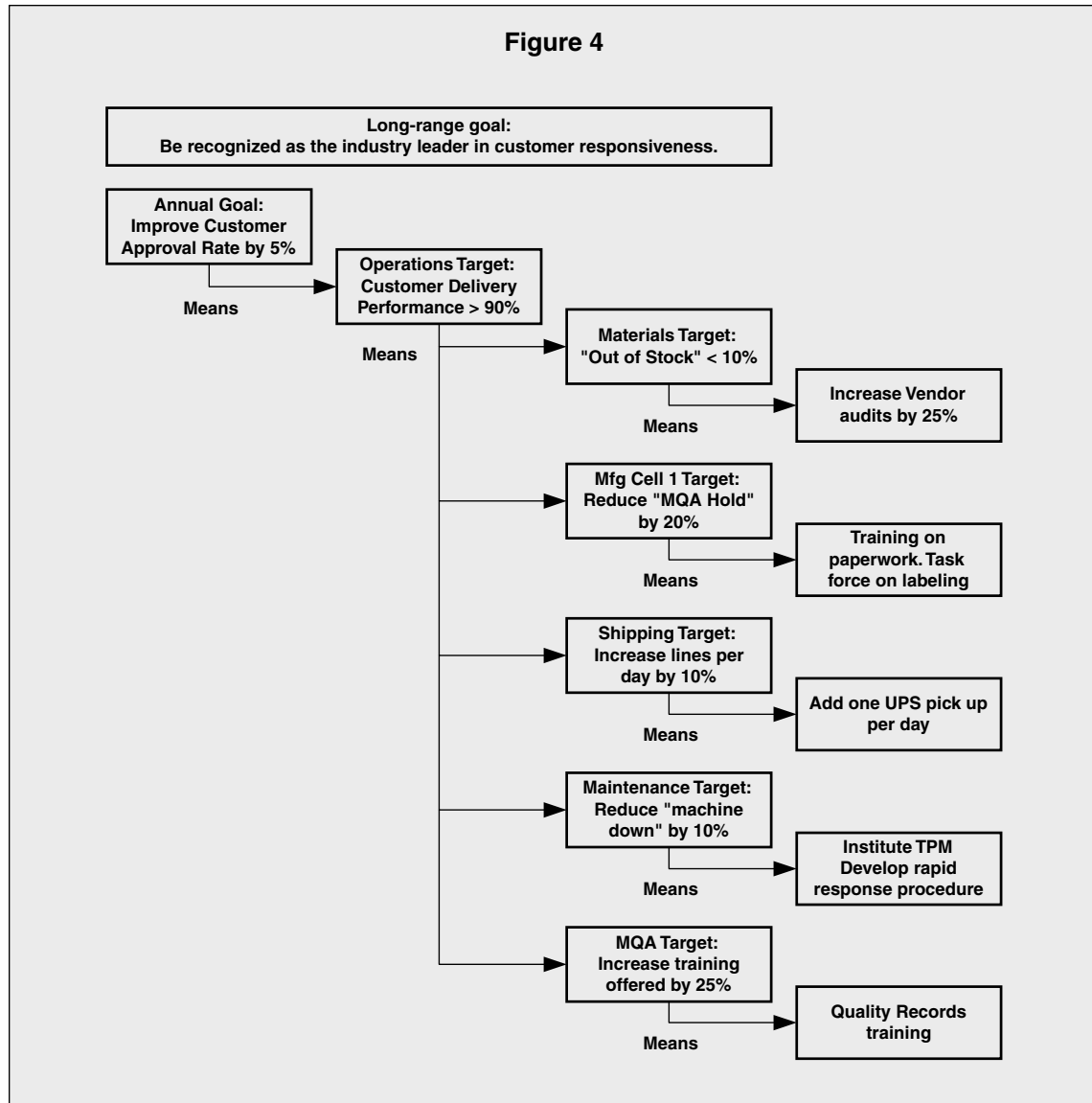
EXECUTION. The best-laid plans can come to naught if they are not properly executed. In terms of TQM, the execution phase is where hoshin management hands responsibility over to daily management. The strategies identified in the plan become part of the daily operation of the company. If the process has been done properly, all employees know what has to be done at their level to reach the top-level goals and thereby move the company toward the future described in the long-term vision.

AUDITING THE PLAN. Essential to hoshin planning is the periodic diagnostic audit, most often done on a monthly basis. Each manager evaluates the progress made toward his own targets, and these reports are rolled up the organization to give feedback on the process to the highest levels. Successes and failures are examined at every level, and corrective action is taken as necessary. If it becomes apparent that something is seriously amiss in the execution, because of a significant change in the situation or perhaps a mistake in the planning phase, the plan may be adjusted and the change communicated up and down the organizational structure as necessary. The audit is a diagnostic review, an opportunity for mid-course corrections and not a time for marking up a scorecard. At the end of the year, the CEO makes an annual diagnostic review of the entire plan, focusing not only on the overall success or failure, but also on the entire process, including the planning phase. The results of this audit become part of the input for the next annual plan, along with the five-to-ten-year plan and changes in the internal or external business environment.

EVALUATION

Although full implementation of hoshin planning in a large organization takes considerable effort, it is recognized as having many advantages over traditional business planning. The discipline of

Figure 4



hoshin planning uncovers the vital few changes that need to be made and ties them to strategic action. It transmits the signals from top management to the rest of the organization in a form that can bring about change at every level. It is participative: the individuals that have to implement the plans have input into their design. Perhaps most importantly, it focuses on the process rather than just the result. This includes continual improvement of the hoshin planning process itself. Organizations that persist in this method over a period of a few years report great benefits from its use.

SEE ALSO: Continuous Improvement; Mission and Vision Statements; Strategic Planning Failure; Strategic Planning Tools; Strategy Implementation; Strategy in the Global Environment; Strategy Levels

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Revised by Gerhard Plenert

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STRATEGY IMPLEMENTATION

A key role of a CEO's is to communicate a vision and to guide strategic planning. Those who have successfully implemented strategic plans have often reported that involving teams at all levels in strategic planning helps to build a shared vision, and increases each individual's motivation to see plans succeed.

Clarity and consistent communication, from mapping desired outcomes to designing performance measures, seem to be essential to success. Successful leaders have often engaged their teams by simply telling the story of their shared vision, and publicly celebrating large and small wins, such as the achievement of milestones. To ensure that the vision is shared, teams need to know that they can test the theory, voice opinions, challenge premises, and suggest alternatives without fear of reprimand.

Implementing strategic plans may require leaders who lead through inspiration and coaching rather than command and control. Recognizing and rewarding success, inspiring, and modeling behaviors is more likely to result in true commitment than use of authority, which can lead to passive resistance and hidden rebellion.

CREATING STRATEGIC PLANS

The senior management team must come together to review, discuss, challenge, and finally agree on the strategic direction and key components of the plan. Without genuine commitment from the senior team, successful implementation is unlikely.

Strategic group members must challenge themselves to be clear in their purpose and intent, and to push for consistent operational definitions that each member of the team agrees to. This prevents differing perceptions or turf-driven viewpoints later on. A carefully chosen, neutral facilitator can be essential in helping the team to overcome process, group dynamics, and interpersonal issues.

A common way to begin is to review the organization's current state and future possibilities using a SWOT (strength, weakness, opportunity, and threat) analysis. This involves identifying strengths and core capabilities in products, resources, people, and customers. These are what the organization is best at, and why it is in business. Many organizations have responded to this review by spinning off ventures that were not related to their core business. For example, Chrysler sold its interests in Maserati, Lamborghini, and Diamond Star and then concentrated on developing “great cars, great trucks.” This sent a clear message to employees and other stakeholders, and triggered the company's renaissance.

Using SWOT, once strengths and core capabilities are defined the next step is to identify weaknesses or vulnerabilities. This is usually the most difficult for organizations and leaders to assess. The identification of gaps is often threatening. In some organizations it is not considered safe to admit to weakness; but an honest appraisal can make the difference between success and failure. Again, reviews should include a look at products, services, resources, customers, and employees. Do the right skills exist in the current staff? Are there enough resources to invest in areas of critical need? Are the appropriate systems and structures in place to support the needs of the team? Does the culture reinforce and connect with the mission and vision of the organization?

Now the review moves to the external environment. What opportunities exist for development and growth? Do these opportunities correspond to the organization's strengths? What are the critical changes the market faces over the next one, three, and five years? How well is the organization positioned for the anticipated market changes? Additional points for debate include the greatest innovation or change that needs to occur for the organization to be successful, and the values that will drive these changes.

Next, using the SWOT assessment process, threats in the current and future market are identified. How is the competition positioned relative to the opportunities for growth that have been identified, and how are they positioned relative to the organization's strengths and weaknesses?

With this information, organizations can finalize their strategy by defining the vision, creating a mission statement, and identifying their competitive

advantages. The communication of the strategy will require a clear, consistent message. It is an ideal time for the leadership to operationally define each critical area of the plan to ensure agreement and commitment. Key stakeholders should be included in the process. Soliciting their input is often a valuable aide in implementation.

Finally, organizations should review each of the gaps that have been identified. Do the necessary resources exist to invest in shoring up the gaps? Are these resources allocated properly? It is usually not possible to address all of the gaps at once. Organizations should create a priority list for action so plans are realistic and focused on the greatest areas of need. These priorities will become a key focus of implementing the plan.

Once the senior leadership team has completed the top-level strategy, the next step is to break that overall goal down into functional areas or core strategies. Typically this will include service/operations management, technology management, product management, supplier management, people management, and financial management, or some variation on these areas. Each identifies how they contribute to achieving the overall strategic plan. They can model the steps taken by the senior team and conduct a SWOT analysis from their vantage point. Once the core strategies are defined, the senior team must ensure that the overall strategy will be achieved; that is, that the sum of the parts (functional strategies) will add up to the whole (overall strategy).

Strategy communication continues to be critical, so operational definitions should not be overlooked. Each functional area should create their own definitions to ensure agreement and commitment. A common source of problems in implementation is that divergent functional perspectives may not be aligned with the overall strategy. Unless these issues are addressed, each area may interpret the plan with a lens of “How does my area win?” rather than “How does the organization win?”

Key stakeholders can be engaged in different ways. Aside from events, publicity, and personification of the vision and strategy by key leaders, stakeholders can be engaged by soliciting their input on the current state of the organization and the vision (similar to the SWOT analysis described earlier). Involving stakeholders in this manner should be done seriously, with an intent to use their distinct perspectives; this can add to the soundness of the analysis. Asking for opinions and then ignoring them can arouse distrust and resentment.

As the strategic plan and performance measures are being created, the organization must make sure that they are aligned with the systems, structure, culture, and performance management architecture. The

best plans may fail because the reward systems motivate different behaviors than those called for in the strategy map and measurement design. For example, if a team approach to business development is outlined in the plan, but sales commission remains individual, organizations will be hard pressed to see a team focus.

The career development, performance management and reward systems must be reviewed to ensure linkage to and support of the strategic intent. Many organizations have found they needed to link their strategic plan to their internal systems and structures to ensure overall alignment and to avoid confusion.

IMPLEMENTING STRATEGIC PLANS

Once strategies have been agreed on, the next step is implementation; this is where most failures occur. It is not uncommon for strategic plans to be drawn up annually, and to have no impact on the organization as a whole.

A common method of implementation is hoopla—a total communication effort. This can involve slogans, posters, events, memos, videos, Web sites, etc. A critical success factor is whether the entire senior team appears to buy into the strategy, and models appropriate behaviors. Success appears to be more likely if the CEO, or a very visible leader, is also a champion of the strategy.

Strategic measurement can help in implementing the strategic plan. Appropriate measures show the strategy is important to the leaders, provide motivation, and allow for follow-through and sustained attention. By acting as operational definitions of the plan, measures can increase the focus of the strategy, aligning the workforce around specific issues. The results can include faster changes (both in strategic implementation, and in everyday work); greater accountability (since responsibilities are clarified by strategic measurement, people are naturally more accountable); and better communication of responsibilities (because the measures show what each group’s primary responsibility is), which may reduce duplication of effort.

Creating a strategic map (or causal business model) helps identify focal points; it shows the theory of the business in easily understood terms, showing the cause and effect linkages between key components. It can be a focal point for communicating the vision and mission, and the plan for achieving desired goals. If tested through statistical-linkage analysis, the map also allows the organization to leverage resources on the primary drivers of success.

The senior team can create a strategic map (or theory of the business) by identifying and mapping the critical few ingredients that will drive overall performance. This can be tested (sometimes immediately,

with existing data) through a variety of statistical techniques; regression analysis is frequently used, because it is fairly robust and requires relatively small data sets.

This map can lead to an instrument panel covering a few areas that are of critical importance. The panel does not include all of the areas an organization measures, rather the few that the top team can use to guide decisions, knowing that greater detail is available if they need to drill down for more intense examination. These critical few are typically within six strategic performance areas: financial, customer/market, operations, environment (which includes key stakeholders), people, and partners/suppliers. Each area may have three or four focal points; for example, the people category may include leadership, common values, and innovation.

Once the strategic map is defined, organizations must create measures for each focal point. The first step is to create these measures at an organizational level. Once these are defined, each functional area should identify how they contribute to the overall measures, and then define measures of their own. Ideally, this process cascades downward through the organization until each individual is linked with the strategy and understands the goals and outcomes they are responsible for and how their individual success will be measured and rewarded.

Good performance measures identify the critical focus points for an organization, and reward their successful achievement. When used to guide an organization, performance measures can be a competitive advantage because they drive alignment and common purpose across an organization, focusing everyone's best efforts at the desired goal. But defining measures can be tricky. Teams must continue to ask themselves, "If we were to measure performance this way, what behavior would that motivate?" For example, if the desired outcome is world-class customer service, measuring the volume of calls handled by representatives could drive the opposite behavior.

CASCADING THE PLAN

In larger organizations, cascading the strategic plan and associated measures can be essential to everyday implementation. To a degree, hoopla, celebrations, events, and so on can drive down the message, but in many organizations, particularly those without extremely charismatic leaders, this is not sufficient.

Cascading is often where the implementation breaks down. For example, only sixteen percent of the respondents in a 1999 Metrus Group survey believed that associates at all levels of their company could describe the strategy. In a 1998 national survey of Quality Progress readers, cascading was often noted

as being a serious problem in implementing strategic measurement systems.

Organizations have found it to be helpful to ask each functional area to identify how they contribute to achieving the overall strategic plan ("functional area" designating whatever natural units exist in the organization—functions, geographies, business units, etc.). Armed with the strategic map, operational definitions and the overall organizational strategic performance measures, each functional area creates their own map of success and defines their own specific performance measures. They can follow the model outlined above starting with their own SWOT analysis.

For example, in the 1990s, Sears cascaded its strategic plan to all of its stores through local store strategy sessions involving all employees. The plan was shown graphically by a strategy map, and reinforced through actions such as the sale of financial businesses such as Allstate. Online performance measures helped store managers to gain feedback on their own performance, and also let them share best practices with other managers.

Functional area leaders may be more successful using a cascade team to add input and take the message forward to others in the area. Developing ambassadors or process champions throughout the organization to support and promote the plan and its implementation can also enhance the chances of success. These champions may be candidates for participation on the design or cascade teams, and should be involved in the stakeholder review process.

EXTERNAL CONSULTANTS

External consultants can play an important role in building and implementing strategic plans if they are used appropriately. Rather than creating or guiding an organization's strategy, the primary role of a consultant should be that of a facilitator, a source of outside perspective, and perhaps as a resource for guiding the process itself. This allows each member of the internal team to participate fully without having to manage the agenda and keep the team focused on the task at hand. Consultants can keep the forum on track by directing the discussion to ensure objective, strategic thinking around key issues, tapping everyone's knowledge and expertise, raising pertinent questions for discussion and debate, managing conflict, and handling group-think and other group dynamics issues.

Consultants can extract the best thinking from the group, and ensure that the vision and mission are based on a sound, critical review of the current state and anticipated future opportunities. Once this is accomplished, consultants can facilitate the identification of desired outcomes and the drivers needed to

achieve them. They can also help to assure that a true consensus is actually reached, rather than an appearance of a consensus due to fear, conformity, or other group effects.

During the cascading phase, consultants can help to avoid failure by facilitating the linkage from the over-arching corporate strategy, through the departmental and or functional level to the team and individual level. This is a point where turf interests can invade the thought process, coloring local measurement design to ensure local rewards. This may not align with the overall strategic intent, so care must be taken to continually link back to the over-arching vision of the organization.

Building and implementing winning strategic plans is a continuous journey, requiring routine reviews and refinement of the measures and the strategic plans themselves. By partnering with internal teams, stakeholders and trusted external consultants, leaders can develop better strategic plans and implement them more successfully.

STRATEGY IMPLEMENTATION ISSUES

Strategy implementation almost always involves the introduction of change to an organization. Managers may spend months, even years, evaluating alternatives and selecting a strategy. Frequently this strategy is then announced to the organization with the expectation that organization members will automatically see why the alternative is the best one and will begin immediate implementation. When a strategic change is poorly introduced, managers may actually spend more time implementing changes resulting from the new strategy than was spent in selecting it. Strategy implementation involves both macro-organizational issues (e.g., technology, reward systems, decision processes, and structure), and micro-organizational issues (e.g., organization culture and resistance to change).

MACRO-ORGANIZATIONAL ISSUES OF STRATEGY IMPLEMENTATION

Macro-organizational issues are large-scale, system-wide issues that affect many people within the organization. Galbraith and Kazanjian argue that there are several major internal subsystems of the organization that must be coordinated to successfully implement a new organization strategy. These subsystems include technology, reward systems, decision processes, and structure. As with any system, the subsystems are inter-related, and changing one may impact others.

Technology can be defined as the knowledge, tools, equipment, and work methods used by an organization in providing its goods and services. The tech-

nology employed must fit the selected strategy for it to be successfully implemented. Companies planning to differentiate their product on the basis of quality must take steps to assure that the technology is in place to produce superior quality products or services. This may entail tighter quality control or state-of-the-art equipment. Firms pursuing a low-cost strategy may take steps to automate as a means of reducing labor costs. Similarly, they might use older equipment to minimize the immediate expenditure of funds for new equipment.

Reward systems or incentive plans include bonuses and other financial incentives, recognition, and other intangible rewards such as feelings of accomplishment and challenge. Reward systems can be effective tools for motivating individuals to support strategy implementation efforts. Commonly used reward systems include stock options, salary raises, promotions, praise, recognition, increased job autonomy, and awards based on successful strategy implementation. These rewards can be made available only to managers or spread among employees throughout the organization. Profit sharing and gain sharing are sometimes used at divisional or departmental levels to more closely link the rewards to performance.

Questions and problems will undoubtedly occur as part of implementation. Decisions pertaining to resource allocations, job responsibilities, and priorities are just some of the decisions that cannot be completely planned until implementation begins. Decision processes help the organization make mid-course adjustments to keep the implementation on target.

Organizational structure is the formal pattern of interactions and coordination developed to link individuals to their jobs and jobs to departments. It also involves the interactions between individuals and departments within the organization. Current research supports the idea that strategies may be more successful when supported with structure consistent with the new strategic direction. For example, departmentalizations on the basis of customers will likely help implement the development and marketing of new products that appeal to a specific customer segment and could be particularly useful in implementing a strategy of differentiation or focus. A functional organizational structure tends to have lower overhead and allows for more efficient utilization of specialists, and might be more consistent with a low-cost strategy.

MICRO-ORGANIZATIONAL ISSUES OF STRATEGY IMPLEMENTATION

Micro-organizational issues pertain to the behavior of individuals within the organization and how individual actors in the larger organization will view strategy implementation. Implementation can be studied by looking at the impact organization culture and

resistance to change has on employee acceptance and motivation to implement the new strategy.

Peters and Waterman focused attention on the role of culture in strategic management. Organizational culture is more than emotional rhetoric; the culture of an organization develops over a period of time is influenced by the values, actions and, beliefs of individuals at all levels of the organization.

Persons involved in choosing a strategy often have access to volumes of information and research reports about the need for change in strategies. They also have time to analyze and evaluate this information. What many managers fail to realize is that the information that may make one strategic alternative an obvious choice is not readily available to the individual employees who will be involved in the day-to-day implementation of the chosen strategy. These employees are often comfortable with the old way of doing things and see no need to change. The result is that management sees the employee as resisting change.

Employees generally do not regard their response to change as either positive or negative. An employee's response to change is simply behavior that makes sense from the employee's perspective. Managers need to look beyond what they see as resistance and attempt to understand the employee's frame of reference and why they may see the change as undesirable.

FORCE FIELD ANALYSIS

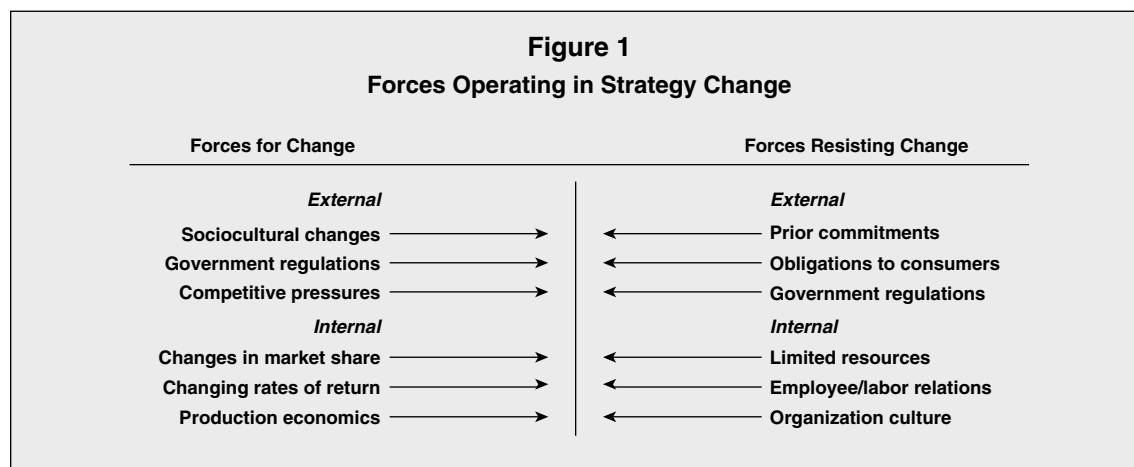
One technique for evaluating forces operating in a change situation is force field analysis. This technique uses a concept from physics to examine the forces for and against change. The length of each arrow as shown in Figure 1 represents the relative strength of each force for and against change. An equilibrium point is reached when the sum of each set of forces is equal. Movement requires that forces for the

change exceed forces resisting the change. Reducing resisting forces is usually seen as preferable to increasing supporting forces, as the former will likely reduce tension and the degree of conflict.

This model is useful for identifying and evaluating the relative power of forces for and against change. It is a useful way of visualizing salient forces and may allow management to better assess the probable direction and speed of movement in implementing new strategies. Forces for change can come from outside the organization or from within. External forces for change may result from sociocultural factors, government regulations, international developments, technological changes, and entry or exit of competitors. Internal forces for change come from within the organization and may include changes in market share, rising production costs, changing financial conditions, new product development, and so on.

Similarly, forces resisting change may result from external or internal sources. Common external pressures opposing change are contractual commitments to other businesses (suppliers, union), obligations to customers and investors, and government regulations of the firm or industry. Internal forces resisting change are usually abundant; limited organizational resources (money, equipment, personnel) is usually one of the first reasons offered as to why change cannot be implemented. Labor agreements limit the ability of management to transfer and, sometimes, terminate employees. Organization culture may also limit the ability of a firm to change strategy. As the experience at Levi Strauss & Co. suggests, it is often hard to convince employees of the need for change when their peers and other members of the organization are not supportive of the proposed change.

The total elimination of resistance to change is unlikely because there will almost always remain some uncertainty associated with a change. Techniques that have the potential to reduce resistance to change when



implementing new strategies include participation, education, group pressure, management support, negotiation, co-optation and coercion.

Participation is probably the most universally recommended technique for reducing resistance to change. Allowing affected employees to participate in both the planning and implementation of change can contribute to greater identification with the need for and understanding of the goals of the new strategy. Participation in implementation also helps to counteract the disruption in communication flows, which often accompanies implementation of a change. But participation has sometimes been overused. Participation does not guarantee acceptance of the new strategy, and employees do not always want to participate. Furthermore, participation is often time consuming and can take too long when rapid change is needed.

Another way to overcome resistance to implementing a new strategy is to educate employees about the strategy both before and during implementation. Education involves supplying people with information required to understand the need for change. Education can also be used to make the organization more receptive to the need for the change. Furthermore, information provided during the implementation of a change can be used to build support for a strategy that is succeeding or to redirect efforts in implementing a strategy that is not meeting expectations.

Group pressure is based on the assumption that individual attitudes are the result of a social matrix of co-workers, friends, family, and other reference groups. Thus, a group may be able to persuade reluctant individuals to support a new strategy. Group members also may serve as a support system aiding others when problems are encountered during implementation. However, the use of a group to introduce change requires that the group be supportive of the change. A cohesive group that is opposed to the change limits the ability of management to persuade employees that a new strategy is desirable.

Management can take steps employees will view as being supportive during the implementation of a change. Management may extend the employees time to gradually accept the idea of change, alter behavior patterns, and learn new skills. Support might also take the form of new training programs, or simply providing an outlet for discussing employee concerns.

Negotiation is useful if a few important resisters can be identified, perhaps through force field analysis. It may be possible to offer incentives to resisters to gain their support. Early retirement is frequently used to speed implementation when resistance is coming from employees nearing retirement age.

Co-optation is similar to negotiation in that a leader or key resistor is given an important role in the implementation in exchange for supporting a change.

Manipulation involves the selective use of information or events to influence others. Such techniques may be relatively quick and inexpensive; however, employees who feel they were tricked into not resisting, not treated equitably, or misled may be highly resistant to subsequent change efforts. Distrust of management is often the result of previous manipulation.

Coercion is often used to overcome resistance. It may be explicit (resistance may be met with termination) or implicit (resistance may influence a promotion decision). Coercion may also result in the removal of resisters through either transfer or termination. Coercion often leads to resentment and increased conflict. However, when quick implementation of a change is needed or when a change will be unpopular regardless of how it is implemented, some managers feel coercion may be as good as most alternatives and faster than many others.

ROLE OF TOP MANAGEMENT

Top management is essential to the effective implementation of strategic change. Top management provides a role model for other managers to use in assessing the salient environmental variables, their relationship to the organization, and the appropriateness of the organization's response to these variables. Top management also shapes the perceived relationships among organization components.

Top management is largely responsible for the determination of organization structure (e.g., information flow, decision-making processes, and job assignments). Management must also recognize the existing organization culture and learn to work within or change its parameters. Top management is also responsible for the design and control of the organization's reward and incentive systems.

Finally, top management are involved in the design of information systems for the organization. In this role, managers influence the environmental variables most likely to receive attention in the organization. They must also make certain that information concerning these key variables is available to affected managers. Top-level managers must also provide accurate and timely feedback concerning the organization's performance and the performance of individual business units within the organization. Organization members need information to maintain a realistic view of their performance, the performance of the organization, and the organization's relationship to the environment.

SEE ALSO: Strategic Planning Failure; Strategic Planning Tools; Strategy Formulation; Strategy in the Global Environment; Strategy Levels

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STRATEGY LEVELS

Although alignment of strategic initiatives is a corporate-wide effort, considering strategy in terms of levels is a convenient way to distinguish among the various responsibilities involved in strategy formulation and implementation. A convenient way to classify levels of strategy is to view corporate-level strategy as responsible for market definition, business-level strategy as responsible for market navigation, and functional-level strategy as the foundation that supports both of these (see Table 1).

CORPORATE-LEVEL STRATEGY

Corporate-level strategies address the entire strategic scope of the enterprise. This is the "big picture" view of the organization and includes deciding in which product or service markets to compete and in which geographic regions to operate. For multi-business firms, the resource allocation process—how cash, staffing, equipment and other resources are distributed—is typically established at the corporate level. In addition, because market definition is the domain of corporate-level strategists, the responsibility for diversification, or the addition of new products or services to the existing product/service line-up, also falls within the realm of corporate-level strategy. Similarly, whether to compete directly with other firms or to selectively establish cooperative relationships—strategic alliances—falls within the purview corporate-level strategy, while requiring ongoing input from

Table 1
Corporate, Business, and Functional Strategy

Level of Strategy	Definition	Example
Corporate strategy	Market definition	Diversification into new product or geographic markets
Business strategy	Market navigation	Attempts to secure competitive advantage in existing product or geographic markets
Functional strategy	Support of corporate strategy and business strategy	Information systems, human resource practices, and production processes that facilitate achievement of corporate and business strategy

business-level managers. Critical questions answered by corporate-level strategists thus include:

1. What should be the scope of operations; i.e.; what businesses should the firm be in?
2. How should the firm allocate its resources among existing businesses?
3. What level of diversification should the firm pursue; i.e., which businesses represent the company's future? Are there additional businesses the firm should enter or are there businesses that should be targeted for termination or divestment?
4. How diversified should the corporation's business be? Should we pursue related diversification; i.e., similar products and service markets, or is unrelated diversification; i.e., dissimilar product and service markets, a more suitable approach given current and projected industry conditions? If we pursue related diversification, how will the firm leverage potential cross-business synergies? In other words, how will adding new product or service businesses benefit the existing product/service line-up?
5. How should the firm be structured? Where should the boundaries of the firm be drawn and how will these boundaries affect relationships across businesses, with suppliers, customers and other constituents? Do the organizational components such as research and development, finance, marketing, customer service, etc. fit together? Are the responsibilities of each business unit clearly identified and is accountability established?
6. Should the firm enter into strategic alliances—cooperative, mutually-beneficial relationships with other firms? If so, for what reasons? If not, what impact might this have on future profitability?

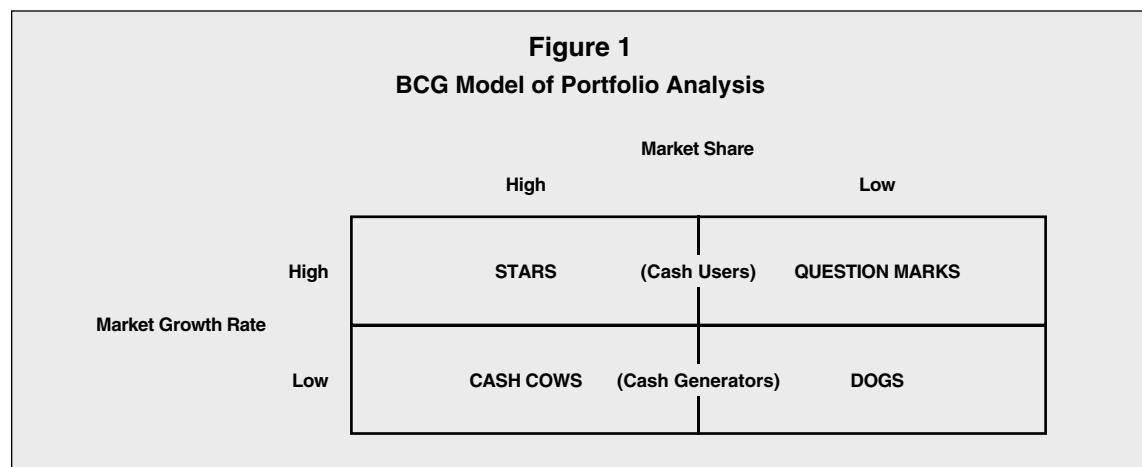
As the previous questions illustrate, corporate strategies represent the long-term direction for the organization. Issues addressed as part of corporate strategy include those concerning diversification, acquisition, divestment, strategic alliances, and formulation of new business ventures. Corporate strategies deal with plans for the entire organization and change as industry and specific market conditions warrant.

Top management has primary decision making responsibility in developing corporate strategies and these managers are directly responsible to shareholders. The role of the board of directors is to ensure that top managers actually represent these shareholder interests. With information from the corporation's multiple businesses and a view of the entire scope of operations and markets, corporate-level strategists have the most advantageous perspective for assessing organization-wide competitive strengths and weaknesses, although as a subsequent section notes, corporate strategists are paralyzed without accurate and up-to-date information from managers at the business-level.

CORPORATE PORTFOLIO ANALYSIS

One way to think of corporate-level strategy is to compare it to an individual managing a portfolio of investments. Just as the individual investor must evaluate each individual investment in the portfolio to determine whether or not the investment is currently performing to expectations and what the future prospects are for the investment, managers must make similar decisions about the current and future performances of various businesses constituting the firm's portfolio. The Boston Consulting Group (BCG) matrix is a relatively simple technique for assessing the performance of various segments of the business.

The BCG matrix classifies business-unit performance on the basis of the unit's relative market share and the rate of market growth as shown in Figure 1.



Products and their respective strategies fall into one of four quadrants. The typical starting point for a new business is as a question mark. If the product is new, it has no market share, but the predicted growth rate is good. What typically happens in an organization is that management is faced with a number of these types of products but with too few resources to develop all of them. Thus, the strategic decision-maker must determine which of the products to attempt to develop into commercially viable products and which ones to drop from consideration. Question marks are cash users in the organization. Early in their life, they contribute no revenues and require expenditures for market research, test marketing, and advertising to build consumer awareness.

If the correct decision is made and the product selected achieves a high market share, it becomes a BCG matrix star. Stars have high market share in high-growth markets. Stars generate large cash flows for the business, but also require large infusions of money to sustain their growth. Stars are often the targets of large expenditures for advertising and research and development to improve the product and to enable it to establish a dominant position in the industry.

Cash cows are business units that have high market share in a low-growth market. These are often products in the maturity stage of the product life cycle. They are usually well-established products with wide consumer acceptance, so sales revenues are usually high. The strategy for such products is to invest little money into maintaining the product and divert the large profits generated into products with more long-term earnings potential, i.e., question marks and stars.

Dogs are businesses with low market share in low-growth markets. These are often cash cows that have lost their market share or question marks the company has elected not to develop. The recommended strategy for these businesses is to dispose of them for whatever revenue they will generate and reinvest the money in more attractive businesses (question marks or stars).

Despite its simplicity, the BCG matrix suffers from limited variables on which to base resource allocation decisions among the business making up the corporate portfolio. Notice that the only two variables composing the matrix are relative market share and the rate of market growth. Now consider how many other factors contribute to business success or failure. Management talent, employee commitment, industry forces such as buyer and supplier power and the introduction of strategically-equivalent substitute products or services, changes in consumer preferences, and a host of others determine ultimate business viability. The BCG matrix is best used, then, as a beginning point, but certainly not as the final determination for resource allocation decisions as it was originally

intended. Consider, for instance, Apple Computer. With a market share for its Macintosh-based computers below ten percent in a market notoriously saturated with a number of low-cost competitors and growth rates well-below that of other technology pursuits such as biotechnology and medical device products, the BCG matrix would suggest Apple divest its computer business and focus instead on the rapidly growing iPod business (its music download business). Clearly, though, there are both technological and market synergies between Apple's Macintosh computers and its fast-growing iPod business. Divesting the computer business would likely be tantamount to destroying the iPod business.

A more stringent approach, but still one with weaknesses, is a competitive assessment. A competitive assessment is a technique for ranking an organization relative to its peers in the industry. The advantage of a competitive assessment over the BCG matrix for corporate-level strategy is that the competitive assessment includes critical success factors, or factors that are crucial for an organization to prevail when all organizational members are competing for the same customers. A six-step process that allows corporate strategist to define appropriate variables, rather than being locked into the market share and market growth variables of the BCG matrix, is used to develop a table that shows a businesses ranking relative to the critical success factors that managers identify as the key factors influencing failure or success. These steps include:

1. Identifying key success factors. This step allows managers to select the most appropriate variables for its situation. There is no limit to the number of variables managers may select; the idea, however, is to use those that are key in determining competitive strength.
2. Weighing the importance of key success factors. Weighting can be on a scale of 1 to 5, 1 to 7, or 1 to 10, or whatever scale managers believe is appropriate. The main thing is to maintain consistency across organizations. This step brings an element of realism to the analysis by recognizing that not all critical success factors are equally important. Depending on industry conditions, successful advertising campaigns may, for example, be weighted more heavily than after-sale product support.
3. Identifying main industry rivals. This step helps managers focus on one of the most common external threats; competitors who want the organization's market share.
4. Managers rating their organization against competitors.

5. Multiplying the weighted importance by the key success factor rating.
6. Adding the values. The sum of the values for a manager's organization versus competitors gives a rough idea if the manager's firm is ahead or behind the competition on weighted key success factors that are critical for market success.

A competitive strength assessment is superior to a BCG matrix because it adds more variables to the mix. In addition, these variables are weighted in importance in contrast to the BCG matrix's equal weighting of market share and market growth. Regardless of these advantages, competitive strength assessments are still limited by the type of data they provide. When the values are summed in step six, each organization has a number assigned to it. This number is compared against other firms to determine which is competitively the strongest. One weakness is that these data are ordinal: they can be ranked, but the differences among them are not meaningful. A firm with a score of four is not twice as good as one with a score of two, but it is better. The degree of "betterness," however, is not known.

CORPORATE GRAND STRATEGIES

As the previous discussion implies, corporate-level strategists have a tremendous amount of both latitude and responsibility. The myriad decisions required of these managers can be overwhelming considering the potential consequences of incorrect decisions. One way to deal with this complexity is through categorization; one categorization scheme is to classify corporate-level strategy decisions into three different types, or grand strategies. These grand strategies involve efforts to expand business operations (growth strategies), decrease the scope of business operations (retrenchment strategies), or maintain the status quo (stability strategies).

GROWTH STRATEGIES

Growth strategies are designed to expand an organization's performance, usually as measured by sales, profits, product mix, market coverage, market share, or other accounting and market-based variables. Typical growth strategies involve one or more of the following:

1. With a concentration strategy the firm attempts to achieve greater market penetration by becoming highly efficient at servicing its market with a limited product line (e.g., McDonalds in fast foods).
2. By using a vertical integration strategy, the firm attempts to expand the scope of its current

operations by undertaking business activities formerly performed by one of its suppliers (backward integration) or by undertaking business activities performed by a business in its channel of distribution (forward integration).

3. A diversification strategy entails moving into different markets or adding different products to its mix. If the products or markets are related to existing product or service offerings, the strategy is called concentric diversification. If expansion is into products or services unrelated to the firm's existing business, the diversification is called conglomerate diversification.

STABILITY STRATEGIES

When firms are satisfied with their current rate of growth and profits, they may decide to use a stability strategy. This strategy is essentially a continuation of existing strategies. Such strategies are typically found in industries having relatively stable environments. The firm is often making a comfortable income operating a business that they know, and see no need to make the psychological and financial investment that would be required to undertake a growth strategy.

RETRENCHMENT STRATEGIES

Retrenchment strategies involve a reduction in the scope of a corporation's activities, which also generally necessitates a reduction in number of employees, sale of assets associated with discontinued product or service lines, possible restructuring of debt through bankruptcy proceedings, and in the most extreme cases, liquidation of the firm.

- Firms pursue a turnaround strategy by undertaking a temporary reduction in operations in an effort to make the business stronger and more viable in the future. These moves are popularly called downsizing or rightsizing. The hope is that going through a temporary belt-tightening will allow the firm to pursue a growth strategy at some future point.
- A divestment decision occurs when a firm elects to sell one or more of the businesses in its corporate portfolio. Typically, a poorly performing unit is sold to another company and the money is reinvested in another business within the portfolio that has greater potential.
- Bankruptcy involves legal protection against creditors or others allowing the firm to restructure its debt obligations or other payments,

typically in a way that temporarily increases cash flow. Such restructuring allows the firm time to attempt a turnaround strategy. For example, since the airline hijackings and the subsequent tragic events of September 11, 2001, many of the airlines based in the U.S. have filed for bankruptcy to avoid liquidation as a result of stymied demand for air travel and rising fuel prices. At least one airline has asked the courts to allow it to permanently suspend payments to its employee pension plan to free up positive cash flow.

- Liquidation is the most extreme form of retrenchment. Liquidation involves the selling or closing of the entire operation. There is no future for the firm; employees are released, buildings and equipment are sold, and customers no longer have access to the product or service. This is a strategy of last resort and one that most managers work hard to avoid.

BUSINESS-LEVEL STRATEGIES

Business-level strategies are similar to corporate-strategies in that they focus on overall performance. In contrast to corporate-level strategy, however, they focus on only one rather than a portfolio of businesses. Business units represent individual entities oriented toward a particular industry, product, or market. In large multi-product or multi-industry organizations, individual business units may be combined to form strategic business units (SBUs). An SBU represents a group of related business divisions, each responsible to corporate headquarters for its own profits and losses. Each strategic business unit will likely have its own competitors and its own unique strategy. A common focus of business-level strategies are sometimes on a particular product or service line and business-level strategies commonly involve decisions regarding individual products within this product or service line. There are also strategies regarding relationships between products. One product may contribute to corporate-level strategy by generating a large positive cash flow for new product development, while another product uses the cash to increase sales and expand market share of existing businesses. Given this potential for business-level strategies to impact other business-level strategies, business-level managers must provide ongoing, intensive information to corporate-level managers. Without such crucial information, corporate-level managers are prevented from best managing overall organizational direction. Business-level strategies are thus primarily concerned with:

1. Coordinating and integrating unit activities so they conform to organizational strategies (achieving synergy).

2. Developing distinctive competencies and competitive advantage in each unit.
3. Identifying product or service-market niches and developing strategies for competing in each.
4. Monitoring product or service markets so that strategies conform to the needs of the markets at the current stage of evolution.

In a single-product company, corporate-level and business-level strategies are the same. For example, a furniture manufacturer producing only one line of furniture has its corporate strategy chosen by its market definition, wholesale furniture, but its business is still the same, wholesale furniture. Thus, in single-business organizations, corporate and business-level strategies overlap to the point that they should be treated as one united strategy. The product made by a unit of a diversified company would face many of the same challenges and opportunities faced by a one-product company. However, for most organizations, business-unit strategies are designed to support corporate strategies. Business-level strategies look at the product's life cycle, competitive environment, and competitive advantage much like corporate-level strategies, except the focus for business-level strategies is on the product or service, not on the corporate portfolio.

Business-level strategies thus support corporate-level strategies. Corporate-level strategies attempt to maximize the wealth of shareholders through profitability of the overall corporate portfolio, but business-level strategies are concerned with (1) matching their activities with the overall goals of corporate-level strategy while simultaneously (2) navigating the markets in which they compete in such a way that they have a financial or market edge—a competitive advantage—relative to the other businesses in their industry.

ANALYSIS OF BUSINESS-LEVEL STRATEGIES

PORTER'S GENERIC STRATEGIES. Harvard Business School's Michael Porter developed a framework of generic strategies that can be applied to strategies for various products and services, or the individual business-level strategies within a corporate portfolio. The strategies are (1) overall cost leadership, (2) differentiation, and (3) focus on a particular market niche. The generic strategies provide direction for business units in designing incentive systems, control procedures, operations, and interactions with suppliers and buyers, and with making other product decisions.

Cost-leadership strategies require firms to develop policies aimed at becoming and remaining the lowest cost producer and/or distributor in the industry. Note here that the focus is on cost leadership, not price

leadership. This may at first appear to be only a semantic difference, but consider how this fine-grained definition places emphases on controlling costs while giving firms alternatives when it comes to pricing (thus ultimately influencing total revenues). A firm with a cost advantage may price at or near competitors prices, but with a lower cost of production and sales, more of the price contributes to the firm's gross profit margin. A second alternative is to price lower than competitors and accept slimmer gross profit margins, with the goal of gaining market share and thus increasing sales volume to offset the decrease in gross margin. Such strategies concentrate on construction of efficient-scale facilities, tight cost and overhead control, avoidance of marginal customer accounts that cost more to maintain than they offer in profits, minimization of operating expenses, reduction of input costs, tight control of labor costs, and lower distribution costs. The low-cost leader gains competitive advantage by getting its costs of production or distribution lower than the costs of the other firms in its relevant market. This strategy is especially important for firms selling unbranded products viewed as commodities, such as beef or steel.

Cost leadership provides firms above-average returns even with strong competitive pressures. Lower costs allow the firm to earn profits after competitors have reduced their profit margin to zero. Low-cost production further limits pressures from customers to lower price, as the customers are unable to purchase cheaper from a competitor. Cost leadership may be attained via a number of techniques. Products can be designed to simplify manufacturing. A large market share combined with concentrating selling efforts on large customers may contribute to reduced costs. Extensive investment in state-of-the-art facilities may also lead to long run cost reductions. Companies that successfully use this strategy tend to be highly centralized in their structure. They place heavy emphasis on quantitative standards and measuring performance toward goal accomplishment.

Efficiencies that allow a firm to be the cost leader also allow it to compete effectively with both existing competitors and potential new entrants. Finally, low costs reduce the likely impact of substitutes. Substitutes are more likely to replace products of the more expensive producers first, before significantly harming sales of the cost leader unless producers of substitutes can simultaneously develop a substitute product or service at a lower cost than competitors. In many instances, the necessity to climb up the experience curve inhibits a new entrants ability to pursue this tactic.

Differentiation strategies require a firm to create something about its product that is perceived as unique within its market. Whether the features are real, or just in the mind of the customer, customers must perceive the product as having desirable features not commonly

found in competing products. The customers also must be relatively price-insensitive. Adding product features means that the production or distribution costs of a differentiated product will be somewhat higher than the price of a generic, non-differentiated product. Customers must be willing to pay more than the marginal cost of adding the differentiating feature if a differentiation strategy is to succeed.

Differentiation may be attained through many features that make the product or service appear unique. Possible strategies for achieving differentiation may include warranty (Sears tools have lifetime guarantee against breakage), brand image (Coach handbags, Tommy Hilfiger sportswear), technology (Hewlett-Packard laser printers), features (Jenn-Air ranges, Whirlpool appliances), service (Makita hand tools), and dealer network (Caterpillar construction equipment), among other dimensions. Differentiation does not allow a firm to ignore costs; it makes a firm's products less susceptible to cost pressures from competitors because customers see the product as unique and are willing to pay extra to have the product with the desirable features.

Differentiation often forces a firm to accept higher costs in order to make a product or service appear unique. The uniqueness can be achieved through real product features or advertising that causes the customer to perceive that the product is unique. Whether the difference is achieved through adding more vegetables to the soup or effective advertising, costs for the differentiated product will be higher than for non-differentiated products. Thus, firms must remain sensitive to cost differences. They must carefully monitor the incremental costs of differentiating their product and make certain the difference is reflected in the price.

Focus, the third generic strategy, involves concentrating on a particular customer, product line, geographical area, channel of distribution, stage in the production process, or market niche. The underlying premise of the focus strategy is that the firm is better able to serve its limited segment than competitors serving a broader range of customers. Firms using a focus strategy simply apply a cost-leader or differentiation strategy to a segment of the larger market. Firms may thus be able to differentiate themselves based on meeting customer needs through differentiation or through low costs and competitive pricing for specialty goods.

A focus strategy is often appropriate for small, aggressive businesses that do not have the ability or resources to engage in a nation-wide marketing effort. Such a strategy may also be appropriate if the target market is too small to support a large-scale operation. Many firms start small and expand into a national organization. Wal-Mart started in small towns in the South and Midwest. As the firm gained in market knowledge and acceptance, it was able to expand throughout the

South, then nationally, and now internationally. The company started with a focused cost-leader strategy in its limited market and was able to expand beyond its initial market segment.

Firms utilizing a focus strategy may also be better able to tailor advertising and promotional efforts to a particular market niche. Many automobile dealers advertise that they are the largest-volume dealer for a specific geographic area. Other dealers advertise that they have the highest customer-satisfaction scores or the most awards for their service department of any dealer within their defined market. Similarly, firms may be able to design products specifically for a customer. Customization may range from individually designing a product for a customer to allowing the customer input into the finished product. Tailor-made clothing and custom-built houses include the customer in all aspects of production from product design to final acceptance. Key decisions are made with customer input. Providing such individualized attention to customers may not be feasible for firms with an industry-wide orientation.

FUNCTIONAL-LEVEL STRATEGIES. Functional-level strategies are concerned with coordinating the functional areas of the organization (marketing, finance, human resources, production, research and development, etc.) so that each functional area upholds and contributes to individual business-level strategies and the overall corporate-level strategy. This involves coordinating the various functions and operations needed to design, manufacture, deliver, and support the product or service of each business within the corporate portfolio. Functional strategies are primarily concerned with:

- Efficiently utilizing specialists within the functional area.
- Integrating activities within the functional area (e.g., coordinating advertising, promotion, and marketing research in marketing; or purchasing, inventory control, and shipping in production/operations).
- Assuring that functional strategies mesh with business-level strategies and the overall corporate-level strategy.

Functional strategies are frequently concerned with appropriate timing. For example, advertising for a new product could be expected to begin sixty days prior to shipment of the first product. Production could then start thirty days before shipping begins. Raw materials, for instance, may require that orders are placed at least two weeks before production is to start. Thus, functional strategies have a shorter time orientation than either business-level or corporate-level strategies. Accountability is also easiest to establish with functional strategies because results

of actions occur sooner and are more easily attributed to the function than is possible at other levels of strategy. Lower-level managers are most directly involved with the implementation of functional strategies.

Strategies for an organization may be categorized by the level of the organization addressed by the strategy. Corporate-level strategies involve top management and address issues of concern to the entire organization. Business-level strategies deal with major business units or divisions of the corporate portfolio. Business-level strategies are generally developed by upper and middle-level managers and are intended to help the organization achieve its corporate strategies. Functional strategies address problems commonly faced by lower-level managers and deal with strategies for the major organizational functions (e.g., marketing, finance, production) considered relevant for achieving the business strategies and supporting the corporate-level strategy. Market definition is thus the domain of corporate-level strategy, market navigation the domain of business-level strategy, and support of business and corporate-level strategy by individual, but integrated, functional level strategies.

SEE ALSO: Generic Competitive Strategies; Porter's 5-Forces Model; Strategic Planning Failure; Strategic Planning Tools; Strategy Formulation; Strategy Implementation; Strategy in the Global Environment

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STRATEGY IN THE GLOBAL ENVIRONMENT

Globalization was the buzzword of the 1990s, and in the twenty first century, there is no evidence that globalization will diminish. Essentially, globalization refers to growth of trade and investment, accompanied by the growth in international businesses, and the integration of economies around the world. According to Punnett (2004) the globalization concept is based on a number of relatively simple premises:

- Technological developments have increased the ease and speed of international communication and travel.
- Increased communication and travel have made the world smaller.
- A smaller world means that people are more aware of events outside of their home country, and are more likely to travel to other countries.
- Increased awareness and travel result in a better understanding of foreign opportunities.
- A better understanding of opportunities leads to increases in international trade and investment, and the number of businesses operating across national borders.
- These increases mean that the economies around the world are more closely integrated.

Managers must be conscious that markets, supplies, investors, locations, partners, and competitors can be anywhere in the world. Successful businesses will take advantage of opportunities wherever they are and will be prepared for downfalls. Successful managers, in this environment, need to understand the similarities and differences across national boundaries, in order to utilize the opportunities and deal with the potential downfalls.

The globalization of business is easy to recognize in the spread of many brands and services throughout the world. For example, Japanese electronics and automobiles are common in Asia, Europe, and North America, while U.S. automobiles, entertainment, and financial services are also common in Asia, Europe, and North America. Moreover, companies have become transnational or multinational—that is, they are based in one country but have operations in others. For example, Japan-based automaker Honda operates the largest single factory in the United States, while U.S. based Coca-Cola operates plants in other countries including France and Belgium—with about 80 percent of that company's profits come from overseas sales.

During the early 1990s, there were reasons to feel that globalization was working. The economic success

of Singapore, the rapid economic growth in the Asian Tigers (as the Asian countries that grew rapidly were called), the industrializing of countries, such as Brazil and Mexico, and a variety of other positive economic events around the world suggested that the results of globalization were indeed good for development in poorer countries, as well as in richer ones. During the 1990s, the United States experienced one of its most sustained periods of growth as well, and there was much talk of a “new economy”, based on globalization, which was immune to economic shocks and recession.

Unfortunately, this rapid growth was not without consequences. The Seattle meetings of the World Trade Organization turned into a fiasco, with anti-globalization groups demonstrating against globalization on all fronts—from animal rights to environmental concerns, poverty alleviation, and jobs for Americans. The anti-globalization forces have not coalesced into a coherent whole because they represent such diverse and often contradictory views. The vehemence of their protests, however, make it clear that globalization is not a panacea for the world's problems. In addition, the Asian Tigers suffered major economic setbacks in the late 1990s. In 2002, Argentina's economy, which had been one of the stars of the 1990s, crashed, when the country could no longer maintain its currency at par with the U.S. dollar.

Further problems occurred in the Triad economies. Japan, Europe, and the United States, often referred to as the Triad, dominated international trade and investment for much of the second half of the twentieth century. The Japanese economy went into a severe period of recession and deflation in the late 1990s, and in 2001 both the European and the U.S. economies took a downward turn as well. In turn, the rest of the world was negatively affected by the economic situation in the Triad. The terrorist attacks in the United States in September, 2001, exacerbated this already negative economic situation.

In developing appropriate global strategies, managers need to take the benefits and drawbacks of globalization into account. A global strategy must be in the context of events around the globe, as well as those at home.

International strategy is the continuous and comprehensive management technique designed to help companies operate and compete effectively across national boundaries. While companies' top managers typically develop global strategies, they rely on all levels of management in order to implement these strategies successfully. The methods companies use to accomplish the goals of these strategies take a host of forms. For example, some companies form partnerships with companies in other countries, others acquire companies in other countries, others still develop products, services, and marketing campaigns designed to

Table 1
Differences Between Domestic and International Strategy

Factors	Domestic Conditions	Global Conditions
Culture	Homogeneous	Heterogeneous
Currency	Uniform	Different currencies and exchange rates
Economy	Stable and uniform	May be variable and unpredictable
Government	Stable	May be unstable
Labor	Skilled workers available	Skilled workers may be hard to find
Language	Generally a single language	Different languages and dialects
Marketing	Many media, few restrictions	May be fewer media and more restrictions
Transport	Several competitive modes	May be inadequate

Source: World Bank

appeal to customers in other countries. Some rudimentary aspects of international strategies mirror domestic strategies in that companies must determine what products or services to sell, where and how to sell them, where and how they will produce or provide them, and how they will compete with other companies in the industry in accordance with company goals.

The development of international strategies entails attention to other details that seldom, if ever, come into play in the domestic market. These other areas of concern stem from cultural, geographic, and political differences. Consequently, while a company only has to develop a strategy taking into account known governmental regulations, one language (generally), and one currency in a domestic market, it must consider and plan for different levels and kinds of governmental regulation, multiple currencies, and several languages in the global market.

The most recent wave of globalization by U.S. companies began in the 1980s, as companies began to realize that concentrating on the domestic market alone would lead to stagnant sales and profits and that emerging markets offered many opportunities for growth. Part of the motivation for this globalization stemmed from the lost market share in the 1970s to multinational companies from other countries, especially those from Japan. Initially, these U.S. companies tried to emulate their Japanese counterparts by implementing Japanese-style management structures and quality circles. After adapting these practices to meet the needs of U.S. companies and recapturing market share, these companies began to move into new markets to spur growth, enable the acquisition of resources (often at a cost advantage), and gain competitive advantage by achieving greater economies of scale.

The globalization of U.S. companies has not been without concerns and detractors. Exporting U.S. jobs, exploiting child labor, and contributing to poverty have all been charges laid at the doors of U.S. companies.

These charges have been accompanied by demonstrations and consumer boycotts.

Nor have U.S. companies been the only ones affected. Companies in the rest of the developed world have globalized along with U.S. companies, and they have also faced the sometimes negative consequences.

Interestingly, in the late twentieth and early twenty-first century, there has also been a growth in international companies from developing and transitional countries, and this trend can be expected to continue and increase. Exports and investment from the People's Republic of China are a notable example, but companies from Southeast Asia, India, South Africa, and Latin America, to name some countries and regions, are making themselves known around the world.

TYPES OF GLOBAL BUSINESS ACTIVITIES

Businesses may choose to globalize or operate in different countries in four distinct ways: through trade, investment, strategic alliances, and licensing or franchising. Companies may decide to trade tangible goods such as automobiles and electronics (merchandise exports and imports). Alternatively, companies may decide to trade intangible products such as financial or legal services (service exports and imports).

Companies may enter the global market through various kinds of international investments. Companies may choose to make foreign direct investments, which allow them to control companies and assets in other countries. In addition, companies may elect to make portfolio investments, by acquiring the stock of companies in other countries in order to gain control of these companies.

Another way companies tap into the global market is by forming strategic alliances with companies in other countries. While strategic alliances come in many forms, some enable each company to access the home market of the other and thereby market their

products as being affiliated with the well-known host company. This method of international business also enables a company to bypass some of the difficulties associated with internationalization such as different political, regulatory, and social conditions. The home company can help the multinational company address and overcome these difficulties because it is accustomed to them.

Finally, companies may participate in the international market by either licensing or franchising. Licensing involves granting another company the right to use its brand names, trademarks, copyrights, or patents in exchange for royalty payments. Franchising, on the other hand, is when one company agrees to allow a company in another country to use its name and methods of operations in exchange for royalty payments.

OVERVIEW OF INTERNATIONAL STRATEGY DEVELOPMENT

Generally, a company develops its international strategy by considering its overall strategy, which includes its operations at home and abroad. We can consider four aspects of strategy: (1) scope of operations, (2) resource allocation, (3) competitive advantage, and (4) synergy. The first component encompasses the geographic locations—countries and regions—of possible operations as well as possible markets or niches in various regions. Since companies have limited resources and since different regions offer different advantages, managers must select the markets that offer the company the optimal opportunities.

The second component of the global strategy focuses on use of company resources so that a company can compete successfully in the chosen markets. This component of strategy planning also determines the relative importance of various company functions and bases the allocation of resources on the relative importance of each function. For instance, a company may decide to allocate its resources based on product lines or geographical locations.

Next, management must decide where the company can achieve competitive advantage over other companies in the industry. Management can identify their competitive advantage by determining what the company does better (or can do better) than its competitors. Companies may realize this advantage through a host of techniques such as using superior technology, implementing more efficient organizational practices and distribution systems, and cultivating well-known brands. This component of the strategy involves not only identifying existing or potential areas of competitive advantage but also developing a plan for sustaining areas of competitive advantage. Finally, global strategy should involve establishing a plan for the company that enables its various functions and operations to benefit

one another. For example, a company can use one line of products to encourage sales of another line of products and thereby enabling different parts of a business to benefit from each other.

Many companies are now outsourcing many of their operations internationally. For example, if you call to get information on your credit card, you may well be talking to someone in India or Mexico. Equally, manufacturers often outsource production to low labor cost countries. Concerns over ethical issues, such as slave and child labor, have led to companies outsourcing under controlled conditions—offshore production may be subject to surprise visits and searches and outsourced factories are required to conform to specific criteria.

STAGES OF INTERNATIONAL STRATEGY DEVELOPMENT

Strategy development itself generally takes place in two stages: strategy formulation and strategy implementation. When planning a strategy, companies identify their international objectives and put together a strategy that will enable them to realize their goals. During the planning stage managers propose, revise, and finally ratify plans for entering new markets and competing in them.

After a strategy has been agreed on, managers must take steps to have it implemented. Consequently, this stage involves determining when to begin global operations as well as actually starting operations and putting into action the other components of the global strategy.

More specifically, the first stage—strategy formulation—entails analysis of the company and its environment, establishing strategic goals, and developing plans to achieve goals as well as a control framework. By assessing itself and the global business environment, a company can determine what markets, products, services, etc. offer opportunities for growth. This process involves the collection of data on a company and its environment, including information on global markets, regulation, productivity, costs, and competitors. Therefore, the collection of data should supply managers with economic, financial, political, legal, and social information on various countries and their markets for different products or services. Based on this information, managers can determine what markets and products offer economically feasible opportunities for global expansion.

Once this analysis is complete, managers must establish strategic goals, which are the significant goals a company seeks to achieve through a particular pursuit such as entering a new regional market. These goals must be practicable, measurable, and limited to a specific time frame. After the strategic goals have been

established, companies should develop plans that allow them to accomplish their goals, and these plans should concentrate on how to implement strategic plans. Finally, strategy formulation involves a control framework, which is a process management uses to help ensure that a company remains on the right course when implementing its strategic plans. The control framework essentially responds to various developments while the strategic plans are being implemented. For example, if sales are lower than the projected sales that are part of the strategic goals, then a company might increase its marketing efforts and temporarily lower its prices to stimulate additional sales.

INTERNATIONAL MARKET EVALUATION

While many aspects of international strategy and its formulation are similar to their domestic counterparts, some key aspects are not, and hence call for different methods and different kinds of information. Gaining knowledge of international markets is one of these key differences—and a crucial part of developing an international strategy. In order for a company to enter a new market, capture market share, and thereby increase sales and profits, it must know what that market is like. At a basic level, a company must examine different markets, evaluate the advantages and disadvantages of entering each, and select only the markets that show the greatest potential for entry and growth.

When examining different international markets, a company should consider the market potential, competition, regulation, and cultural factors of each. Company managers can assess market potential by collecting data on the gross domestic product (GDP), per capita GDP, population, transportation, and other figures of various countries. This kind of information will enable managers to determine the spending power of the consumers in each country and determine if that spending power allows them to purchase a company's

products or services. Managers also should consider the currency stability of the different markets, which can be done by using documents from the home countries to determine currency value and fluctuation over a period of years.

To select the best markets for entry, managers also should consider the degree of competition within different markets and should anticipate future competition in them as well. Determining the degree of competition involves the identification of all the companies competing in the prospective markets as well as their sizes, market shares, and prices. Managers then should evaluate a prospective market by considering the number of competitors and their characteristics as well as the market conditions—that is, whether the market is saturated with competition and cannot support any new entrants.

Next, managers should evaluate the regulatory environment of the prospective markets, since knowing tax, trade, other related policies is essential for a successful international business. This step entails determining the respective tariffs and trade barriers of prospective markets. Different types of trade barriers may influence the kind of business activity a company chooses for a particular market. For example, if a prospective market has trade barriers that restrict the entry of foreign-made goods, a company might decide to access the market through foreign direct investment and manufacture its products in that country itself. Ownership restrictions also may limit a company's interest in a particular market; some countries permit foreign companies to set up local operations only if they establish a partnership with a local company. In addition, managers should find out if prospective countries charge foreign companies higher taxes or if they offer tax breaks and incentive to encourage economic development. A final consideration companies must make concerning government is stability. Since some countries have rough government transitions resulting from coups and uprisings, companies must countenance the possibility of political turmoil that could substantially disrupt business.

The last step in international market evaluation is the assessment of cultural factors. To avoid difficulties associated with cultural differences, some managers look for new markets that have cultural similarities to their home market, especially for initial international market penetration endeavors. Unlike market potential, competition, and regulation, cultural differences are more difficult to evaluate. Nevertheless, managers must try to determine the consumer needs and preferences in the prospective markets. Managers must also account for cultural differences in labor relations such as worker motivation, compensation, hours, etc. if planning foreign direct investment in an overseas company. Moreover, a thorough understanding of a prospective country's culture will greatly facilitate any

Table 2
Differences Between Domestic and International Strategy

Country	GDP per Capita (2003 Estimate in US\$)
Luxembourg	55,100
United States	37,800
Norway	37,700
Bermuda	36,000
Cayman Islands	35,000
San Marino	34,600
Switzerland	32,800
Denmark	31,200
Iceland	30,900
Austria	30,000

kind of global business enterprise. This cultural knowledge should include a basic understanding of a prospective country's beliefs and attitudes, language and communication styles, dress, food preferences and customs, time and time consciousness, relationships, values, and work ethic. This kind of cultural information is essential for developing an effective and realistic global strategy.

Since conducting primary research is labor intensive and time consuming, managers may obtain preliminary information on prospective markets from books such as Dun & Bradstreet's *Guide to Doing Business Around the World* and *Business Protocol: How to Survive and Succeed in Business*, or the Economist's "Doing Business in. . ." series, which list potential trade opportunities, policies, etiquette, taxes, and so on for various countries.

After examining the prospective markets in this manner, managers are ready to evaluate the advantages and disadvantages of each potential market. One way of doing so is the determination of costs, advantages, and disadvantages of each prospective market. The costs of each market include direct costs and opportunity costs. Direct costs are those a company pays when establishing a business in a new market, such as costs associated with purchasing property and equipment and producing and shipping goods. Opportunity costs, on the other hand, refer to the costs associated with the loss of other opportunities, since entering one market rules out or postpones entering another because of a company's limited resources. Hence, the profits that could have been earned in the alternative market constitute the opportunity costs.

Each prospective market usually has a variety of advantages, such as the possibility for growth, which will lead to greater revenues and profits. Other advantages include relatively low material and labor costs, new technology gaining strategic advantage over competitors, and matching competitors' actions. However, each prospective market also usually has a number of disadvantages, including opportunity costs, greater business complexity, and potential losses stemming from unforeseen aspects of prospective markets and from currency fluctuations. Other disadvantages might result from potential losses associated with unstable political conditions.

ANALYSIS OF TWO INTERNATIONAL STRATEGIES

In the late 1990s after a significant amount of globalization had taken place, business analysts began to examine the success of various strategies for doing business in other countries. This examination led to the distinction between various orientations of international strategies. The main distinction was between

multi-domestic (also called multi-local) international strategies and global strategies. Multi-domestic international strategies refer to those that address competition in each country or region on an individual basis, whereas global strategy refers to addressing competition in an integrated and holistic manner across country and regional boundaries. Hence, multi-domestic international strategies attempt to appeal to the needs of customers in different countries or regions, while global strategies attempt to standardize products and marketing to work across boundaries. Instead of relying on one of these strategies, multinational companies might adopt a different strategy for different products or services. For example, a company might use a global strategy for its electronics and a multi-domestic strategy for its appliances.

Critics of the standardization approach argue that it makes two questionable assumptions: that consumers' needs are becoming more homogenous throughout the world and that consumers prefer high quality and low prices over advanced features and functions. Nevertheless, standardized global strategies have some significant benefits. Companies can reduce their marketing expenditures, for example, if they use the same ads in all their markets. PepsiCo, for example, uses the same television ads in all of its national markets, saving an estimated \$10 million a year. Besides marketing savings, global strategies can lead to other kinds of benefits and advantages in areas such as design, packaging, manufacturing, distribution, customer service, and software development.

Some people argue that companies must customize their products or services to meet the needs of various international markets, and hence must use a multi-domestic strategy at least in part. For example, KFC planned a standardized approach to its foray into the Japanese market, but the company soon realized it had to change its strategy to meet the needs of Japanese consumers and customize its operations in Japan. Consequently, KFC introduced smaller pieces of foods to cater to a Japanese preference, and located restaurants in crowded areas along with other restaurants, moving away from independent sites. As a result of these changes, the fast-food restaurant experienced stronger demand in Japan.

The development of regional trading blocs has promoted an emphasis regional strategies as companies develop plans to take advantage of the conditions within various trading blocs such as the North American Free Trade Agreement (NAFTA), the European Union, the Asia-Pacific Economic Cooperation (APEC) and the Association of Southeast Asian Nations (ASEAN). In addition, the United States has signed 16 different trade agreements with South American countries, creating a foundation for a trading bloc consisting of all North and South American countries. Consequently, companies have been establishing regional strategies designed

around these trading blocs. Nike, for example, established central warehouses for its European distribution, just as it has a central warehouse for its U.S. distribution. This strategy has enabled Nike to reduce its inventory, cut down on redundancy, reduce costs, and enhance availability. In addition, News Corporation originally relied on a global strategy with its STAR-TV satellite television network; attempting to provide the same television shows across Asia in English. The company quickly switched to a multi-domestic strategy, providing programming in local languages after receiving low ratings and advertising dollars with its first approach.

A variety of corporate collapses, and the revelation of unethical and illegal practices in many international companies, has led to a focus on Corporate Governance and Ethics in the early twenty first century. Issues of what constitutes socially responsible behavior are likely to be a major part of global strategy for the coming years.

SEE ALSO: International Business; International Management; International Management; Macroeconomic Forces; Multinational Corporations; Strategic Planning Failure; Strategic Planning Tools; Strategy Formulation; Strategy Implementation; Strategy in the Global Environment; Strategy Levels; Transnational Organization

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STRESS

STRESS IN ORGANIZATIONS

As the pace at which our society operates increases, the pressures for every member of society to keep up with this pace also increase. Many of these pressures

affect people through their jobs. Stress has become the "buzzword" that many people use to describe the impact that these pressures cause. In the short-term, stress can enable individuals to meet high levels of demand or pending deadlines. Prolonged stress, however, has been shown to cause illness and other conditions that can have detrimental effects on an employer's workforce. As Leon Warshaw noted in 1979 in his book on dealing with stress in the workplace: "Stress affects personality, modifying our perceptions, feelings, attitudes and behavior. And it reaches beyond its immediate victims to affect the political, social and work organizations whose activities they direct and carry out." In other words, the increasing rate of stress at work has wide-ranging effects—absenteeism, impaired teamwork, workplace violence, decreased efficiency, increased rates of physical and mental illness, employee burnout, risk of discrimination and growth in early retirement.

In his 2004 article "Workplace Stress Sucks \$300 Billion Annually from Corporate Profits," Ron Ball cites a recent study by Ravi Tangi that establishes a formula for measuring the "hard costs" of stress on business as whole. This formula quantified stress as causing the following:

- 19 percent of absenteeism
- 40 percent of turnover
- 55 percent of employee assistance programs
- 30 percent of short- and long-term disability
- 10 percent of drug plan costs
- 60 percent of total workplace accidents
- 100 percent of workers compensation and litigation complaints

There are many factors that contribute to making a workplace stressful. Research clearly indicates that certain jobs are more stressful than others. For example, people who work as police officers, fire fighters, air traffic controllers, and elected officials are exposed to higher levels of stress than people who work as janitors, florists, medical records technicians, forklift operators, librarians and musical instrument repairers. The factors that contribute to making some jobs more stressful include: level of decision-making required; level of monitoring workers must endure; unpleasant or dangerous physical or emotional conditions; repeated exchange of information with others; and whether job tasks are generally structured or unstructured.

Understanding the factors that contribute to creating stress in the workplace can help employers begin to manage stress among the workforce. The rest of this section will describe some of the detrimental effects of stress on the workplace and offer potential solutions for employers to minimize the potential harm to employees and to the work environment as a whole.

CONTROLLING ABSENCES

In increasing numbers, employees are calling in “sick” when they are really suffering from stress. A 2005 survey reported in the *Silicon Valley/San Jose Business Journal* found that only 38 percent of the employees who called in sick were actually suffering from a physical illness. The other 62 percent of these workers who failed to show up were dealing with stress, family issues, morale issues, motivational issues, etc. These results indicate a need for employers to implement some type of absence control measures.

Research from a wide range of organizations from around the world indicates that about 5 percent of the workforce accounts for about one-third of the absences, or lost days of work. This same research indicates that younger workers often have more absence patterns than older workers. Also, workers with the best attendance records are not always the healthiest or most fit employees. In many instances, the workers with poor attendance records demonstrate poor irregular attendance problems at previous jobs, and within the first six months of any new job. Therefore, employers must take note of attendance patterns of prospective workers (when available) and pay close attention to attendance issues during probationary periods for new hires. Second, employers must set clear rules for attendance at work and identify disciplinary rules that will be enforced if workers fail to comply with the attendance rules. Supervisors must be adequately trained to set for these rules and enforce them for the employer. Further, the employer could examine monthly or quarterly budget reports that review the absenteeism statistics for each department of the company. If there is one department that seems to be experiencing higher-than-normal rates of absenteeism, it could be indicative of stress or morale problems that the employer may need to address.

TEAMWORK ISSUES

Traditional research has taught us that teamwork in the workplace is generally desirable and tends to produce positive results. It is important to note, however, that many workplace teams fail to produce positive results because people often prefer to work with other people who are similar to them. These teams are often comprised of workers who come from diverse backgrounds, and they bring their own biases and cultural perceptions to the team dynamic. On some teams, this diversity can add richness and depth, and on other depths, this diversity facilitates the creation of barriers between team members. Employers can avoid breakdowns in teams by assigning manageable tasks to teams and setting reasonable deadlines for

completion of these tasks. Also, employers should clearly define the charge and expectations for the team project and how it should undertake its mission. The less time teams have to get mired down in harmful infighting, the greater the chance of success.

WORKPLACE VIOLENCE

The following scenario is becoming increasingly typical: In December 2000, Michael McDermott, a software engineer at Edgewater Technology, selects and shoots co-workers in his Wakefield, Mass., office. Seven people die. Employers at the Internet solution provider had recently told McDermott that wages would be garnished from his paycheck to pay the IRS for back taxes.

Because of their increasing frequency, violent acts are now considered a major workplace safety and health threat. A 1999 study by Yale University’s School of Management, which surveyed workers throughout the country asked, “How often are you angry at work?” and more than 20 percent of respondents answered, “All the time.” That seed of dissatisfaction often grows as time passes. The Occupational Safety and Health Administration estimates that two million workers are victims of violent workplace acts each year. By 2003, workplace violence—including assaults and suicides—accounted for 16 percent of all work-related fatal occupational injuries. Homicides are annually among the top three causes of workplace fatalities for all workers.

Organizational interventions aimed at preventing workplace violence satisfy employers’ moral and ethical obligations to provide their employees with safe work environments. Moreover, such interventions also help companies reduce their costs and comply with the law. Workplace violence can cost employers large sums of money. Employers must pay for victims’ medical and psychiatric care, repairs and clean-up, insurance rate hikes, and increased security measures. Additional costs are incurred as the result of absenteeism, as the average victim misses 3.5 days of work following an incident.

Employers must also be concerned about workplace violence for legal reasons. The General Duty Clause of the Occupational Safety and Health Act states that employers can be cited for a violation if there is a recognized danger of workplace violence in their establishment, and they do nothing to prevent it. In addition to being fined by OSHA, employers can also be sued by victims of violence. The legal test for determining employer liability for violent acts committed by non-employees is as follows. The employer is liable if:

- it knew or should have known that a criminal act was probable (e.g., it was warned about threats made to an employee); and

- it could have reasonably protected the employee from criminal assault, but failed to do so; and
- its failure to protect the employee caused the subsequent injuries to occur (in other words, had the employer done its part, the injury would not have happened).

A similar legal test is used to determine employer liability for violent acts committed by employees. An employer is liable for negligent hiring if it knew or should have known of the applicant's violent tendencies, yet decided to hire that person anyway. In a similar vein, successful negligent retention suits can be filed when an employer retains a current employee despite knowledge of violent tendencies. Employers are liable in these situations if they had (or should have had) information signaling the danger of future violent acts, yet ignored this danger.

So what can a company do to minimize the occurrences of violent acts? In 2002, OSHA issued a set of guidelines listing some of the security measures that can be implemented to reduce the threat of violence. These measures include:

- provide improved lighting and employee escort services to and from parking lots
- ensure reception areas can be locked when no one is on duty
- create a policy stipulating that there are always at least two people on duty
- provide security systems, such as electronic access control systems, silent alarms, metal detectors, and video cameras
- establish policies regarding visitor access (sign-in, identification badges)
- equip field staff with cellular phones
- install curved mirrors at hallway intersections or concealed areas as well as bullet-proof glass
- provide safety education for employees so they know what conduct is unacceptable, and what to do if they witness or are subjected to workplace violence
- provide drop safes to limit the amount of cash on hand
- instruct employees not to enter any location where they feel unsafe.

An employer should consider these measures in light of the level of risk at a particular worksite. For example, metal detectors and bullet-proof glass would be appropriate for inner-city emergency departments, abortion clinics, and psychiatric facilities where

violence is highest. In addition to implementing OSHA recommendations, an employer can further minimize violent acts through the use of pre-employment screening, strict anti-violence and anti-drug/alcohol policies, and training. All workers should be taught how to recognize early signs of a troubled or potentially violent person and how to respond to such persons. Managers should be further trained on how to properly handle terminations since such acts often trigger violence.

DECREASED EFFICIENCY AND INCREASED RATES OF PHYSICAL AND MENTAL ILLNESS

Excessive amounts of stress can have debilitating health effects, such as ulcers, colitis, hypertension, headaches, lower back pain, carpal tunnel syndrome and cardiac conditions. Stressed workers may perform poorly, quit their jobs, suffer low morale, generate conflicts among coworkers, miss work, or exhibit indifference toward coworkers and customers. These stress-induced outcomes now cost U.S. businesses somewhere between \$200 and \$500 billion per year.

Stress can sometimes cause workers to turn to drugs and alcohol. The use of drugs and alcohol is pervasive in the United States. For instance, nearly 10 percent of all full-time employees use illicit drugs (primarily marijuana and cocaine), and another 10 percent are alcoholics. An increasing number of U.S. workers are taking some type of stimulant—beyond caffeine. A 1999 Drug Enforcement Agency survey estimated that at least 15 percent of United States adults used methamphetamine. Substance abuse costs U.S. employers an estimated \$75 billion a year in terms of lost productivity, accidents, workers' compensation, health insurance claims, and theft of company property.

While most organizations are taking steps to keep their workplaces drug-free voluntarily, government contractors are required to take such steps. The 1988 Drug-Free Workplace Act states that government contractors must ensure a drug-free workplace by notifying employees about:

- the dangers of drug abuse in the workplace;
- its policy of maintaining a drug-free workplace;
- any available drug counseling, rehabilitation, and employee assistance programs; and
- the penalties that may be imposed upon employees for drug abuse violations occurring in the workplace.

Employers can combat substance abuse at the workplace by screening out applicants and discharging employees who have been identified as substance

abusers. Substance abuse is most commonly detected through urine and blood tests. About two-thirds of all corporations presently require drug testing of current or future employees. Supervisors can also detect substance abuse by observing their employees' behavior. Some of the symptoms to look for are mood swings, slurred speech, flushed cheeks, frequent absences on Mondays and Fridays, missing deadlines, and overreacting to criticism.

Detecting substance abuse early can be quite useful to a company, as illustrated by the findings of a U.S. Postal Service study. The Postal Service tested 5,465 applicants for drugs, but did not use these results in hiring decisions. About 4,000 of these applicants were eventually hired. In a three-year follow-up, employees who tested positive had a 66 percent higher absenteeism rate and a 77 percent greater termination rate than those testing negative. The Postal Service now estimates that had it not hired the drug-positive group, it could have saved \$150 million in absenteeism, rehiring, retraining, and injury compensation costs.

When dealing with current employees with drug problems, some employers take a rehabilitative approach: they help abusers overcome their problem through remedial counseling. Employee assistance programs (EAPs) employ mental health professionals (usually on a contract basis) to provide services to workers who are experiencing substance abuse or other personal problems. For example, the EAP at the Chase Manhattan Bank helps employees resolve problems of drug or alcohol abuse, child care, elder care, marital or family relationship concerns, emotional distress, anxiety, depression, or financial difficulties. Employees may seek help on a voluntary, confidential basis, or may be referred by a supervisor who suspects that the employee's declining job performance is being caused by personal problems.

Many companies currently use EAPs. The potential payoff of an EAP is evidenced by a study that found that every dollar spent on an EAP returned an estimated \$3 to \$5 in lower absenteeism and greater productivity.

Employers must develop written substance abuse policies that specify their approach to handling these problems. The policy should specify the prohibited behaviors and note the consequences employees will face if they break the rules. Such policies serve two purposes: (1) to act as a deterrent and (2) to establish a sound legal basis for taking punitive action (e.g., suspension or discharge).

EMPLOYEE WELLNESS

Employee wellness is a relatively new human resource management focus that seeks to eliminate certain debilitating health problems (e.g., cancer, heart

disease, respiratory problems, hypertension) that can be caused by a person's poor lifestyle choices (e.g., smoking, poor nutrition, lack of exercise, obesity). Such health problems have become quite prevalent: Cancer, heart, and respiratory illnesses alone account for 61 percent of all hospital claims. These ailments can cause workplace problems such as absenteeism, turnover, lost productivity, and increased medical costs. For instance, people who have high blood pressure are 70 percent more likely than others to have medical claims of more than \$5,750 per year, and the cost of medical claims for smokers is 22 percent higher than it is for nonsmokers.

Many organizations attempt to help employees improve or maintain their overall health by offering them employee wellness programs. Such programs provide employees with physical fitness facilities, on-site health screening, and programs to help them quit smoking, manage stress, and improve nutritional habits. Employee wellness programs can be quite effective. Research indicates that participation in a wellness program reduces both absenteeism and turnover, and increases productivity. A study conducted at Mesa Petroleum, for example, found that the productivity difference between participants and non-participants amounted to \$700,000 in the first year, and \$1.3 million in the second year.

If they are to work, wellness programs must successfully enlist "high-risk" individuals—those in greatest need of the program. Unfortunately, most employees who participate in wellness programs are those who fall into a low-risk category. Because at-risk individuals do not seek help, many employee wellness programs fail to meet their objectives. Employers must, then, find some way to motivate high-risk individuals to participate. Some companies offer positive inducements (e.g., cash bonuses) to individuals who participate; other companies focus their efforts on non-participants by imposing certain penalties. For example, they may increase insurance premium contributions of non-participants or raise their deductible levels.

Companies can help eliminate, or at least minimize, job stress. A firm can eliminate many sources of employee stress by implementing effective HRM practices. For instance, the implementation of effective selection and training procedures can help ensure that workers are properly suited to the demands of their jobs. Providing clearly written job descriptions can reduce worker uncertainty regarding job responsibilities. The use of effective performance appraisal systems can relieve stress by clarifying performance expectations. And the implementation of effective pay-for-performance programs can relieve stress by reducing worker uncertainty regarding rewards.

Unfortunately, companies cannot always eliminate all sources of job stress; some stress may be inherent in the job. For instance, some jobs are dangerous

(e.g., logging, police work, firefighting), and some place the worker in demanding interpersonal situations (e.g., customer relations specialists). When job stresses cannot be relieved, the worker must learn to cope with them. A firm can help by offering employees stress counseling or by providing them the opportunity to “work off” their stress through physical exercise. Some of the organizational interventions described earlier, such as the use of EAPs and wellness programs, can be helpful in this regard.

SEE ALSO: Contingent Workers; Employee Assistance Programs; Human Resource Management

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employees in the right positions in the organization at the time that they are needed. HRP involves forecasting, or predicting, the organization’s needs for labor and supply of labor and then taking steps to move people into positions in which they are needed.

Succession planning is the systematic process of defining future management requirements and identifying candidates who best meet those requirements. Succession planning involves using the supply of labor within the organization for future staffing needs. With succession planning, the skills and abilities of current employees are assessed to see which future positions they may take within the organization when other employees leave their positions. Succession planning is typically used in higher-level organizational positions, such as executive-level positions. For instance, if a company predicts that its Chief Executive Officer will retire in the near future, the organization may begin looking months or even years in advance to determine which current employee might be capable of taking over the position of the CEO.

Succession planning is aimed at promoting individuals within the organization and thus makes use of internal selection. Internal selection, as opposed to hiring employees from outside the organization, has a number of benefits and drawbacks. With internal selection, the organization is aware of current employees’ skills and abilities, and therefore is often better able to predict future performance than when hiring from the outside. Because of access to annual performance appraisals and the opinions of the employee’s current managers, the company can have a fairly accurate assessment of the employee’s work capabilities. Additionally, the organization has trained and socialized the employee for a period of time already, so the employee is likely to be better prepared for a position within the organization than someone who does not have that organizational experience. Finally, internal selection is often motivating to others in the organization—opportunities for advancement may encourage employees to perform at a high level.

Despite its many advantages, internal selection can also have some drawbacks. While the opportunities for advancement may be motivating to employees who believe that they can move up within the organization at a future date, those employees who feel that they have been passed over for promotion or are at a career plateau are likely to become discouraged and may choose to leave the organization. Having an employee who has been trained and socialized by the organization may limit the availability of skills, innovation, or creativity that may be found when new employees are brought in from the outside. Finally, internal selection still leaves a position at a lower level that must be staffed from the outside, which may not reduce recruitment and selection costs.

SUCCESSION PLANNING

Succession planning is a critical part of the human resources planning process. Human resources planning (HRP) is the process of having the right number of

Many companies organize their management training and development efforts around succession planning. However, not all organizations take a formal approach to it, and instead do so very informally, using the opinions of managers as the basis for promotion, with little consideration of the actual requirements of future positions. Informal succession planning is likely to result in managers who are promoted due to criteria that are unrelated to performance, such as networking within and outside of the organization. Organizations would be better served by promoting managers who were able to successfully engage in human resource management activities and communicate with employees. Poor succession planning, such as just described, can have negative organizational consequences. Research indicates that poor preparation for advancement into managerial positions leaves almost one-third of new executives unable to meet company expectations for job performance. This may have negative repercussions for the newly promoted manager, the other employees, and the company's bottom line.

STEPS IN SUCCESSION PLANNING

There are several steps in effective succession planning: human resources planning, assessing needs, developing managers, and developing replacement charts and identifying career paths.

HUMAN RESOURCES PLANNING. Engaging in human resources planning by forecasting the organization's needs for employees at upper levels is the first step in succession planning. Some staffing needs can be anticipated, such as a known upcoming retirement or transfer. However, staffing needs are often less predictable—organizational members may leave for other companies, retire unexpectedly, or even die, resulting in a need to hire from outside or promote from within. The organization should do its best to have staff available to move up in the organization even when unexpected circumstances arise. Thus, accurate and timely forecasting is critical.

ASSESSING NEEDS AND DEVELOPING REPLACEMENT CHARTS. The second major step for succession planning is to define and measure individual qualifications needed for each targeted position. Such qualifications should be based on information from a recent job analysis. Once these qualifications are defined, employees must be evaluated on these qualifications to identify those with a high potential for promotion. This may involve assessing both the abilities and the career interests of employees. If a lower-level manager has excellent abilities but little interest in advancement within the organization, then development efforts aimed at promotion will be a poor investment.

To determine the level of abilities of employees within the organization, many of the same selection tools that are used for assessing external candidates can be used, such as general mental ability tests, personality tests, and assessment centers. However, when selecting internally, the company has an advantage in that it has much more data on internal candidates, such as records of an employee's career progress, experience, past performance, and self-reported interests regarding future career steps.

DEVELOPING MANAGERS. The third step of succession planning, which is actually ongoing throughout the process, is the development of the managers who are identified as having promotion potential. In order to prepare these lower-level managers for higher positions, they need to engage in development activities to improve their skills. Some of these activities may include:

- Job rotation through key executive positions. By working in different executive positions throughout the organization, the manager gains insight into the overall strategic workings of the company. Additionally, the performance of this manager at the executive level can be assessed before further promotions are awarded.
- Overseas assignments. Many multinational companies now include an overseas assignment as a way for managers to both learn more about the company and to test their potential for advancement within the company. Managers who are successful at leading an overseas branch of the company are assumed to be prepared to take an executive position in the home country.
- Education. Formal courses may improve managers' abilities to understand the financial and operational aspects of business management. Many companies will pay for managers to pursue degrees such as Masters in Business Administration (MBAs), which are expected to provide managers with knowledge that they could not otherwise gain from the company's own training and development programs.
- Performance-related training and development for current and future roles. Specific training and development provided by the company may be required for managers to excel in their current positions and to give them skills that they need in higher-level positions.

DEVELOPING REPLACEMENT CHARTS AND IDENTIFYING CAREER PATHS. In the final step of succession planning, the organization identifies a career path for each high-potential candidate—those who have the

interest and ability to move upward in the organization. A career path is the typical set of positions that an employee might hold in the course of his or her career. In succession planning, it is a road map of positions and experiences designed to prepare the individual for an upper-level management position. Along with career paths, the organization should develop replacement charts, which indicate the availability of candidates and their readiness to step into the various management positions. These charts are depicted as organizational charts in which possible candidates to replacement others are listed in rank order for each management position. These rank orders are based on the candidates' potential scores, which are derived on the basis of their past performance, experience, and other relevant qualifications. The charts indicate who is currently ready for promotion and who needs further grooming to be prepared for an upper-level position.

PROBLEMS WITH SUCCESSION PLANNING

Succession planning is typically useful to the organization in its human resource planning, and when done properly, can be beneficial to organizational performance. However, there are potential problems associated with the use of succession planning: the crowned prince syndrome, the talent drain, and difficulties associated with managing large amounts of human resources information.

CROWNED PRINCE SYNDROME. The first potential problem in succession planning is the crowned prince syndrome, which occurs when upper management only considers for advancement, those employees who have become visible to them. In other words, rather than looking at a wider array of individual employees and their capabilities, upper management focuses only on one person—the “crowned prince.” This person is often one who has been involved in high-profile projects, has a powerful and prominent mentor, or has networked well with organizational leaders. There are often employees throughout the organization who are capable of and interested in promotion who may be overlooked because of the more visible and obvious “crowned prince,” who is likely to be promoted even if these other employees are available. Not only are performance problems a potential outcome of this syndrome, but also the motivation of current employees may suffer if they feel that their high performance has been overlooked. This may result in turnover of high quality employees who have been overlooked for promotion.

TALENT DRAIN. The talent drain is the second potential problem that may occur in succession planning. Because upper management must identify only a small group of managers to receive training and development for promotion, those managers who are not assigned to development activities may feel overlooked

and therefore leave the organization. This turnover may reduce the number of talented managers that the organization has at the lower and middle levels of the hierarchy. Exacerbating this problem is that these talented managers may work for a competing firm or start their own business, thus creating increased competition for their former company.

MANAGING HUMAN RESOURCE INFORMATION. The final problem that can occur in succession planning is the concern with managing large amounts of human resources information. Because succession planning requires retention of a great deal of information, it is typically best to store and manage it on a computer. Attempting to maintain such records by hand may prove daunting. Even on the computer, identifying and evaluating many years' worth of information about employees' performance and experiences may be difficult. Add to that the challenges of comparing distinct records of performance to judge promotion capability, and this information overload is likely to increase the difficulty of successful succession planning.

Succession planning, which is identifying and preparing managers for future promotions within the organization is one element of successful human resource planning. Unfortunately, many organizations do a poor job of succession planning. Even when it is done properly, succession planning has some potential problems that can harm employee motivation and the company's bottom line. Effective succession planning, however, is likely to improve overall firm performance and to reward and motivate employees within the organization.

SEE ALSO: Employee Screening and Selection; Entrepreneurship; Human Resource Information Systems; Human Resource Management; Management and Executive Development

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SUPPLY CHAIN MANAGEMENT

Supply chain management (SCM) is a broadened management focus that considers the combined impact of all the companies involved in the production of goods and services, from suppliers to manufacturers to wholesalers to retailers to final consumers and beyond to disposal and recycling. This approach to managing production and logistics networks assumes all companies involved in the process of delivering goods to consumers are part of a network, pipeline, or supply chain. It encompasses everything required to satisfy customers and includes determining which products they will buy, how to produce them, and how to deliver them. The supply chain philosophy ensures that customers receive the right products at the right time at an acceptable price and at the desired location.

Increasing competition, complexity, and geographical scope in the business world have led to this broadened scope and continuing improvements in the capabilities of the personal computer have made the optimization of supply chain performance possible. Electronic mail and the Internet have revolutionized communication and data exchange, facilitating the necessary flow of information between the companies in the supply chain.

Companies that practice supply chain management report significant cost and cycle time reductions. For example, Wal-Mart Stores Inc. announced increases in inventory turns, decreases in out-of-stock occurrences, and a replenishment cycle that has moved from weeks to days to hours.

A fundamental premise of supply chain management is to view the network of facilities, processes, and people that procure raw materials, transform them into products, and ultimately distribute them to the customer as an integrated chain, rather than a group of separate, but somewhat interrelated, tasks. The importance of this integration cannot be overstated because the links of the chain are the key to achieving the goal. Every company has a supply chain, but not every company manages their supply chain for strategic advantage.

While easy to understand in theory, the chain management becomes more complex the larger the company and its range of products, and the more international the locations of its suppliers, customers, and distribution facilities. Supply chain management is also complex because companies may be part of several pipelines at the same time. A manufacturer of synthetic rubber, for example, can at the same time be part of the supply chains for tires, mechanical goods, industrial products, shoe materials and footwear, aircraft parts, and rubberized textiles.

LINKS WITHIN THE SUPPLY CHAIN

With supply chain management, information, systems, processes, efforts, and ideas are integrated across all functions of the entire supply chain. Supply chains become more complex as goods flow from more than one supplier to more than one manufacturing and distribution site. The possibility of outside sources for functions like assembly and packaging are also options in the chain.

The basic tasks of a company do not change, regardless of whether or not it practices supply chain management. Suppliers are still required to supply material, manufacturing still manufactures, distribution still distributes, and customers still purchase. All of the traditional functions of a company still take place. The ultimate difference in a company that manages its supply chain is their focus shifts from what goes on inside each of the links, to include the connections between the links.

A company practicing effective supply chain management also recognizes that the chain has connections that extend beyond the traditional boundaries of the organization. Managing the connections is where the integration of the supply chain begins. Any improvement in or disruption to the supply chain linkages affects the entire chain. The cumulative supply chain effect of uncertainty can be seen in this example. Suppose a manufacturer of integrated circuit boards receives a shipment of poor quality silicon. Because the manufacturer is dependent on its supplier for timely shipments, the poor quality lot results in a shipment delay to one of its customers. The computer manufacturer is forced to shut down its line because component circuit boards are not available. As a result, computer shipments to retailers are late. Finally, the customer goes to the retailer to purchase a new computer but is unable to find the desired brand. Frustrated, the customer decides to buy the product of a competitor. Consider too, the timing involved in this process. Because of production and transportation lead times, the actual receipt of the poor quality silicon probably occurred several months before the customer made a computer purchase.

A wide variety of events occurs in the supply chain that is largely unpredictable. Suppliers can make early or late deliveries. Customers can increase, decrease, or even cancel orders. New customers can place large orders. Machines or trucks can break down. Employees can get sick, go on strike, and quit. Supplier shipments or manufactured products can have quality problems. In the past, companies prepared for uncertainty and improved their levels of customer satisfaction by allowing inventory levels to rise. This is no longer an acceptable solution. High inventories translate to increased carrying costs and risks of obsolescence that can limit a company's flexibility.

Throughout the supply chain, inventory is traditionally created and held at many locations. Any time a portion of that inventory can be reduced or eliminated, the company decreases costs and increases profitability. Shortening the length of time it takes to move a product from one link of the chain to the next also shortens the cycle time of the entire chain and thereby increases competitiveness and customer satisfaction.

IMPORTANCE OF CHAIN VISIBILITY

SCM provides needed visibility along the chain to improve performance. Without visibility up and down the supply chain an effect known as the “bullwhip” can result. In reviewing the demand patterns at various points in their supply chain, Procter & Gamble (P&G) noticed that while the consumers, or in this case the babies, consumed diapers at a steady rate, the demand order variability in the supply chain was amplified as it moved up the supply chain. Without being able to see the sales of its product at the distribution channel stage, they had to rely on sales orders from resellers to make product forecasts, plan capacity, control inventory, and schedule production. This lack of visibility resulted in excessive inventory, inaccurate forecasts, excessive or constrained capacity, and reduced customer service levels. Each link in the supply chain stockpiled inventory to counteract the effects of demand uncertainty and variability. Various studies have shown that these inventory stockpiles can equal as much as 100 days’ supply and by considering the effect on raw materials, the total chain could contain more than a year’s supply of inventory.

Companies like P&G, Dell Computer, Hewlett-Packard, Campbell Soup, M&M/Mars, Nestlé, Quaker Oats, and many others have been able to control the bullwhip effect. Some of the methods used include innovative information flow for forecasting demand, revised price structures, or developing strategies to allow smaller batch sizes, while still maximizing transportation efficiency. By understanding the effects of supply chain integration, visibility and information, these companies were able to develop strategies that enabled them to overcome many problems.

SCM BENEFITS

In addition to helping to create an efficient, integrated company, supply chain management also plays a large part in reducing costs. A study by the A.T. Kearney management consulting company estimates that supply chain costs can represent more than eighty percent of the cost structure in a typical manufacturing company. These numbers indicate that even slight improvement in the process eventually can translate into millions of dollars on the bottom line. These costs

include lost sales due to poor customer service or out of stock retail products. For every dollar of inventory in a system, there are one to two dollars of hidden supply chain costs: working capital costs, asset costs, delivery costs, write downs and so on. Leaner inventories free up a large amount of capital.

Depending on the industry, companies leading in supply chain performance achieve savings equal to three to seven percent of revenues compared with their median performing peers. One Efficient Consumer Response Study, sponsored by the Food Marketing Institute, estimated that forty two days could be removed from the typical grocery supply chain, freeing up \$30 billion in current costs, and reducing inventories by forty-one percent.

REQUIREMENTS OF SCM

CUSTOMER FOCUS. All sources agree the fundamental focus of supply chain management begins by understanding the customer, their values, and requirements. This includes internal customers of the organization and the final customer as well. Companies must seek to know exactly what the customer expects from the product or service and must then focus their efforts on meeting these expectations. The process of suppliers must be aligned with the buying process of the customer. Even performance measurements must be customer driven, because the behavior of the final customer ultimately controls the behavior of the entire supply chain.

INFORMATION FLOW. Another requirement is increased information flow. Companies must invest in the technology that will provide access to greater amounts of timely information. Information makes it possible to move to more instantaneous merchandise replenishment and allow all parties in the chain to respond quickly to all changes. Information facilitates the decisions of the supply chain such as evaluation and exploration of alternatives. Information flow is key to the visibility of the product as it flows through the supply chain and is needed at every stage of the customer order. Improving the intelligence of where products are in the chain also improves inventory management and customer service capabilities. Issues of trust and security are fundamental to information integration. Many organizations are successfully dealing with these issues through the development of partnering relationships.

EMPLOYEE AND MANAGEMENT SUPPORT. As partners in the supply chain must also be highly flexible, supply chain strategies often require changes in processes and traditional roles. All members of the supply chain must be open to new methods and ideas. The flexibility and change required is often difficult for organizations and their employees. It is however,

the ability to embrace necessary changes that will position a company to take advantage of the benefits of supply chain management. Because the supply chain is a dynamic entity, businesses are advised to organize for change. They must anticipate resistance and be prepared to deal with it. Training in the concepts of supply chain management will aid in this effort. Also, as with any organization change, the new ideas must be supported and embraced by all levels of management.

MEASUREMENT. Often companies undertake ways to improve themselves without also thinking about how to measure whether or not they have been successful. Performance measurement must consider the entire supply chain and be related to the effect on the ultimate goal of customer satisfaction. Therefore the final concept of supply chain management is ensuring measurement techniques are adequately considered during the implementation of supply chain management techniques.

ACHIEVING THE GOALS OF SUPPLY CHAIN MANAGEMENT

Methods being used to achieve the goals of supply chain management can be divided into two categories. Some methods seek to achieve the goals through improving the processes within the links of the chain. There are also methods that seek to achieve the goals by changing the roles or functions of the chain.

The methods used to improve the process include modeling various alternatives, effective measurement, improved forecasting, designing for the supply chain, cross-docking inventories, direct store delivery, and electronic data interchange (EDI) technology. Direct store delivery methods bypass the distribution center. Products using direct store delivery include bakeries, cosmetics, snack foods, and other items where product freshness or quick replenishment is required. Cross-docking is a process that keeps products from coming to rest as inventory in a distribution center. Products arrive at the center and are immediately off loaded, moved, and immediately reloaded on waiting delivery trucks.

EDI technology is the electronic exchange of information between the computer systems of two or more companies. It is used to process transactions like order entry, order confirmation, order changes, invoicing, and pre-shipment notices. The EDI movement was started by big retailers like Wal-Mart, Kmart, and Target. To do business with some of these large customers, EDI processing is a requirement. EDI delivers results by facilitating the constant and rapid exchange of information between companies. Customer order, invoice, and other information that would previously require hours of data entry can be done in minutes.

Point of sale data can be transmitted in a matter of minutes or hours instead of weeks.

Methods that use changing roles include postponement strategies, vendor managed inventory, and supplier integration. Postponement strategies delay the differentiation of products in order to gain flexibility to respond to changing customer needs. Product inventory is held in a generic form so that as specific demand becomes known, the product can be finished and shipped in a timely manner. Vendor managed inventory and continuous replenishment programs are ways in which organizations are reaching beyond their boundaries and integrating their efforts with suppliers and customers. Point of sale data is transferred from customer to supplier in real time so that automatic replenishments can occur. Companies can even surrender the responsibility for managing inventory to some of their suppliers. Supplier integration moves beyond partnering with suppliers and focuses on aligning with all critical suppliers the supply chain.

SCOR

The supply chain operations reference (SCOR) model is a process reference model, developed in 1996 by the Supply-Chain Council, as a cross-industry diagnostic, benchmarking, and process improvement tool for supply chain management. SCOR provides a complete set of supply chain performance metrics, industry best practices, and enabling systems' functionality that allows firms to thoroughly analyze all aspects of their current supply chain. A number of notable firms, such as IBM, Intel, 3M, and Siemens have used the model successfully.

The model separates supply chain operations into five distinct processes: plan, source, make, deliver, and return. Within these are three levels of process detail. Level I deals with process types, Level II is the configuration level and deals with process categories, and Level III is the process element level. The SCOR model endorses twelve performance metrics. The Levels II and III metrics are keys to the Level I metrics that fall within the five process categories. Empirical research by Archie Lockamy III and Kevin McCormack found while some of the practices found in the model did not have expected degree of impact, many of the practices did result in significant supply chain performance improvements.

SCM AND THE ENVIRONMENT

As environmental practices increase in importance supply chain strategies will do the same. Firms finding that release of waste into the biophysical environment is becoming more difficult or even impossible are saddled with a new responsibility, waste control.

This may have far-reaching implications for supply chain management. When source reduction is impossible or incomplete, the firm must deal with returned products as well as disassembly, recycling, reuse, repairwork or remanufacturing, all of which mean more movement of material. The supply chain is then extended beyond the final consumer to become a “reverse supply chain” (note that an earlier SCOR model contained only four processes; the “return” process was later added).

THE FUTURE

Supply chain management is an evolving process. It is much like the philosophies of total quality management (TQM) or business process reengineering in that there is no stopping point. Emerging technologies and successful supply chain management techniques used by companies today are the foundation of future improvements in techniques and technologies. Supply chain management can provide great payoffs in cost and efficiency to the organization.

Enabled with improving technology and a broader view of the organization, supply chain management addresses the issues of complexity and competition by exploiting and enhancing the chain to provide strategic, financial, and competitive advantage.

SEE ALSO: Distribution and Distribution Requirements Planning; Electronic Data Interchange and Electronic Funds Transfer; Reverse Supply Chain Logistics

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SWEATSHOPS

Sweatshops are work environments that possess three major characteristics—long hours, low pay, and unsafe or unhealthy working conditions. Sweatshops have been a factor in the production of goods around the world for centuries, but the globalization of business has led increasing numbers of major corporations to take advantage of low-cost sweatshop labor in developing countries. Recent examples of sweatshop conditions in the garment industry have caused an international outcry by labor leaders, activists, and government officials. Although manufacturers tend to deny it, sweatshops still exist, even in the United States.

THE HISTORY OF SWEATSHOPS

One of the earliest examples of a sweatshop was in the crude textile mills of Ecuador. Spanish conquerors put the native population to work in sweatshop conditions in the manufacture of cloth, rough garments, and assorted textile goods. The use of the term is more recently traced to working conditions in England’s emerging manufacturing industries, where women and children sweated in jobs performed under horrid conditions—the work being monotonous, the hours long, and the pay miserably low. The British government established a Select Committee of the House of Lords on the Sweating System in 1889, thus publicly exposing the conditions for the first time. With massive immigration into the United States, especially beginning in the late 1880s, sweatshops became common in American cities on the east coast.

Southern and eastern European immigrants were easy prey for manufacturers who paid low wages and provided poor working conditions in factories. In

many instances, the newly arrived immigrants were glad to have these sweating jobs at any wage, no matter how low. The situation in many of the new industries was ripe for sweatshops to develop. Social and economic conditions in most cities produced a large population from which to find workers willing to accept any wage and management systems that neglected the workers, thus removing any consideration of the human factor in manufacturing. Generally, workers lacked access to the kind of knowledge and resources that would enable them to overcome the impossible working conditions, while governments, both local and national, were unwilling to intervene on their behalf. Other characteristics of sweatshops included overcrowding, lack of sanitary conditions, no worker breaks or relief, demands to complete a task within a limited period of time, and—as important to the continuance of the sweatshop—the total lack of job security.

EFFORTS TO IMPROVE SWEATSHOPS

Initial efforts to correct or improve sweatshops in the United States began in 1884 with legislation in the state of New York to eliminate the production of tobacco products in homes—a practice common in the cigar industry. Similar state labor laws proved generally ineffective before trade unions were able to bring about slight relief. But it took federal minimum wage and maximum-hours legislation in 1938 before sweatshops began to disappear.

Making matters worse for the workers, there were few if any advocates for improving sweatshop conditions. The immigrants had virtually no voice in management or government. Many could not read or write—much less read and write in English—and were essentially pawns of often unscrupulous, profit-driven manufacturers. Educational opportunities were seldom available, and moving up the corporate ladder was not an option.

Jacob Riis did much to call attention to the living conditions of many of these workers in 1903 with the publication of *How the Other Half Lives*, a photojournalistic account of the living conditions in New York's tenements. Although powerful, Riis's photographs did little to address working conditions in U.S. sweatshops. In the eighth edition of their classic study on the United States working class, *Labor Problems: A Text Book*, published in 1912, Thomas S. Adams and Helen Sumner outlined the three conditions in sweatshops and added a disturbing fourth—danger to the consumer's health from using goods manufactured in sweatshops. Few American consumers took notice, but union involvement in improving working conditions was quite evident beginning in the 1910s, especially in the garment industry.

Another industry where sweatshop conditions existed (and still do) was the agricultural industry, which employs a great many immigrants (both legal and illegal) for harvesting or picking fruits and vegetables. The working conditions included long daylight hours under a hot California or Florida sun with few or no breaks. Wages were just as miserable and women and children were especially abused. These workers seldom had the means or education to improve their plight, and all desperately needed the money. Once again unions attempted to bring some relief to the workers, and labor battles, including fights and even open warfare, were all too frequent.

SWEATSHOPS IN MODERN INDUSTRY

Sweatshops have not been abolished to this day, as is evident in numerous recent examples in the apparel industry that have brought national attention and government reaction to the issue. Garment manufacturers found new ways to finish goods in factories outside the United States, where labor costs were miniscule but sweatshops flourished. In countries in South and Central America and Asia, such companies found a ready labor supply where wage expectations were low and the sweatshop thrived. Companies like The Gap, Liz Claiborne, Kathie Lee Gifford, Nike, and Wal-Mart all came under criticism for marketing goods produced in sweatshops.

National attention was directed at these and other companies in the apparel industry through media outlets, and consumers were sometimes advised not to purchase certain brand names. Advocacy groups, particularly vibrant among college students (who got their start by refusing to buy college or university logo merchandise produced in sweatshops), organize consumer awareness of sweatshop conditions and attempt to pressure companies into ceasing their sweatshop-labor practices. A site was mounted on the Internet by Sweatshop Watc—a coalition of labor, community, civil rights, immigrant, and women's organizations (www.sweatshopwatch.com)—to further spread awareness and coalesce activist projects.

The U.S. government has lent its efforts toward eliminating the problem, proposing legislation aimed at ending the use of sweatshop labor in foreign countries. However, the most devastating blow to companies marketing sweatshop goods came in the form of lawsuits filed by the dozens.

Despite the concentrated efforts, negative publicity, and legislative action, the proliferation of sweatshops continues. Representatives of the New York-based National Labor Committee traveled to El Salvador during 1998 to see firsthand local working conditions. While visiting a factory that made jackets for Liz Claiborne, the group found workers reporting fifteen-hour days, two daily bathroom breaks, and

appalling working conditions—all for sixty cents an hour. Women were routinely tested for pregnancy and fired if pregnant. Protestors were fired and overtime was enforced. Suspensions without pay were common. A jacket selling for \$198 was manufactured for eight-four cents (leaving labor costs as 0.4 percent of the retail price). If sweatshops are illegal in the United States, critics ask, why are U.S. firms neglecting such offshore conditions among their suppliers of finished goods?

Does a remedy exist? In the United States, the courts are a possible avenue of relief. In May 1999, a Los Angeles court issued subpoenas to seventeen U.S. firms—including The Gap, Wal-Mart, Sears, Tommy Hilfiger, Jones Apparel Group, and Warnaco—seeking over one billion dollars in damages over apparel goods reportedly manufactured in Siapan sweatshops. In February 1999, U.S. garment firms announced support of another one billion dollar suit against sweatshop factories in the Mariana Islands.

Congress also joined the fight; while a 1997 bill aimed at curbing sweatshops in the garment industry failed, a 1998 House hearing was held to discourage the use of sweatshop labor in the garment industry. In early 1999, a presidential task force finally agreed on a foreign factory monitoring system. The task force—which included representatives of apparel manufacturers, labor unions, and human rights organizations—set forth a voluntary workplace code of conduct that included provisions prohibiting forced labor, harassment or abuse of workers, and discrimination, and provisions supporting worker rights to organize and participate in collective bargaining, minimum wage and benefit guarantees, and a safe and healthy work environment. While the Clinton administration and industry leaders praised the agreement as historic, some people criticized it for making participation voluntary and not addressing the need for workers to receive a basic living wage.

But the problem of sweatshops is likely to deepen. Structural adjustment programs, which are often imposed on developing countries by major financial institutions like the International Monetary Fund, are among the hallmarks of the emerging global economy. These programs, which derive from liberal capitalist economic theories, can act indirectly as barriers against labor laws and labor organization (under the logic that these constitute threats to free trade) while deregulating the flow of foreign investment. Hence, the prevailing social and economic climate makes sweatshop labor not only possible, but attractive (and for some industries, almost necessary).

In addition, the governments of many developing nations are reluctant to enforce strong worker-protection laws. They view cheap labor as one of the major assets they can offer to attract investment by multina-

tional companies, which creates jobs and provides capital for development. These governments argue that all of the major developed nations limited worker rights early in their economic histories, and that they should be allowed to do so as well, with the goal of eventually achieving the prosperity that would enable them to eliminate sweatshops. They also claim that sweatshops often provide the best wages and working conditions available to workers in the developing world, who might otherwise be condemned to prostitution, begging, or subsistence farming.

Meanwhile, popular organizing against sweatshop labor is also gaining momentum. These groups try to capitalize on the knowledge that, if the general public were aware of the conditions in which certain consumer items were produced, they would refrain from buying them. Improved global communications, using such tools as satellite and the Internet, make it easy to disseminate information about the business activities of multinational corporations in developing nations. Activists hope that consumer pressure will force companies to become more socially responsible or face devastating negative publicity, like that experienced by Nike and The Gap.

Co-op America, sponsor of the “No Sweat!” program to end sweatshop labor, recommends that individuals and businesses take the following steps to aid the cause: organize local community groups to support a sweatshop-free purchasing law in local or state government; investigate companies with which you do business and insist they maintain good records on labor issues; use your clout as a shareholder to encourage companies to treat employees fairly; and purchase union-made, local, and fair-trade approved goods. Businesses can submit to workplace monitoring under programs run by the Fair Labor Association, Social Accountability International, or Worldwide Responsible Apparel Production.

SEE ALSO: Ethics; Globalization; International Management; Stress

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SYNERGY

Synergy, also known as synergism, refers to the combined effects produced by two or more parts, elements, or individuals. Simply stated, synergy results when the whole is greater than the sum of the parts. For example, two people can move a heavy load more easily than the two working individually can each move their half of the load. Synergy can be a positive or negative outcome of combined efforts.

According to the *American Heritage Dictionary*, the term "synergy" is derived from the Greek word *sunergos*, meaning "working together." Positive synergy is sometimes called the $2 + 2 = 5$ effect. Operating independently, each subsystem can produce two units of output. However, by combining their efforts and working together effectively, the two subsystems can produce five units of output.

Negative synergy can be called the $2 + 2 = 3$ effect. Again, individuals operating alone can each produce two units of output. However, with negative synergy, the combination of their efforts results in less output than what they would have achieved if they had each worked alone. Negative synergy can result from inefficient committees, business units that lack strategic fit, and from other poorly functioning joint efforts.

HISTORY OF SYNERGY

Synergy has origins as a theological term describing the cooperation of human effort with divine will. In recent years the term has most often been used in association with systems theory. Systems theory, as applied to biology and the physical sciences, describes the interdependence of various parts of an organism, such as the human body. The human body, as a system, is comprised of a set of interrelated subsystems, including the brain, skeleton, muscles, and others. To fully understand the larger system, one must examine the subsystems and the interrelationships. Systems theory was one of the first management theories to explicitly state that changing one of the subsystems could have an impact on the total system. Synergy was developed as a measure of the effectiveness of the joint efforts of various subsystems. Discussions of synergy also figure

in medical literature, such as in research that addresses how the effects of medication on individuals are magnified when combined with a special diet or exercise.

INDIVIDUALS AND SYNERGY

One way to observe synergy in an organization is to observe the combined efforts of individuals working together. Synergy can result from the efforts of people serving on committees or teams. By combining their knowledge, insights, and ideas, groups often make better decisions than would have been made by the group members acting independently. Positive synergy resulting from group decisions may well include the generation of more ideas, more creative solutions, increased acceptance of the decision by group members, and increased opportunity for the expression of diverse opinions. Much of the current interest in teams and team building is an effort to achieve positive synergy through the combined efforts of team members.

Negative synergy occurs in groups, committees, and other joint efforts for a number of reasons. Groups commonly experience negative synergy because group decisions are often reached more slowly, and thus may be more expensive to make than individual decisions. The opportunity costs for having a group of high-paid executives spend an afternoon in a meeting rather than in more productive endeavors can be quite high. Negative synergy can also occur in group decisions if an individual is allowed to dominate and control the group decision. Also, groupthink—the pressure to conform—may cause the group to strive for harmony instead of evaluating information and alternative courses of action honestly and objectively.

SYNERGY AT THE ORGANIZATION LEVEL

Organizations strive to achieve positive synergy or strategic fit by combining multiple products, business lines, or markets. One way to achieve positive synergy is by acquiring related products, so that sales representatives can sell numerous products during one sales call. Rather than having two representatives make two sales calls to a potential customer, one sales representative can offer the broader mix of products.

Mergers and acquisitions are corporate-level strategies designed to achieve positive synergy. The 2004 acquisition of AT&T Wireless by Cingular was an effort to create customer benefits and growth prospects that neither company could have achieved on its own—offering better coverage, improved quality and reliability, and a wide array of innovative services for consumers.

Negative synergy is also possible at the corporate level. Downsizing and the divestiture of businesses is

in part the result of negative synergy. For instance, Kimberly-Clark Corporation set out to sharpen its emphasis on consumer and health care products by divesting its tiny interests in business paper and pulp production. According to the company, the removal of the pulp mill will enhance operational flexibility and eliminate distraction on periphery units, thus allowing the corporation to concentrate on a single, core business activity.

The intended result of many business decisions is positive synergy. Managers expect that combining employees into teams or broadening the firm's product or market mix will result in a higher level of performance. However, the mere combination of people or business elements does not necessarily lead to better outcomes, and the resulting lack of harmony or coordination can lead to negative synergy.

SEE ALSO: Mergers and Acquisitions; Organizational Structure; Teams and Teamwork

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SYSTEMS ANALYSIS

Systems analysis is the process of examining a business situation for the purpose of developing a system solution to a problem or devising improvements to such a situation. Before the development of any system can begin, a project proposal is prepared by the users of the potential system and/or by systems

analysts and submitted to an appropriate managerial structure within the organization.

PROJECT PROPOSAL

The project proposal is the attempt to respond to or take advantage of a particular situation and is an essential element for correctly launching the system analysis. Although there are no hard and fast rules as to the form and content of the project proposal, the proposal should address the following points:

- The specifics of the business situation or problem.
- The significance of the problem to the organization.
- Alternative solutions.
- The possible use of computer information systems to solve the problem.
- The various people interested in or possessing knowledge relevant to the problem.

System projects that are to be shared by a number of departments and users are usually approved by a committee rather than an individual. A project proposal is submitted to a committee that determines the merits of the proposal and decides whether or not to approve it. The committee is made up of people from various functional areas of the organization who have an interest in the operation and information of the proposed system.

THE SYSTEMS DEVELOPMENT LIFE CYCLE

The systems development life cycle (SDLC) describes a set of steps that produces a new computer information system. The SDLC is a problem-solving process. Each step in the process delineates a number of activities. Performing these activities in the order prescribed by the SDLC will bring about a solution to the business situation. The SDLC process consists of the following phases:

1. Preliminary investigation—the problem is defined and investigated.
2. Requirements definition—the specifics of the current system as well as the requirements of the proposed new system are studied and defined.
3. Systems design—a general design is developed with the purpose of planning for the construction of the new system.
4. Systems development—the new system is created.
5. System installation—the current operation is converted to run on the new system.

6. Systems evaluation and monitoring—the newly operational system is evaluated and monitored for the purpose of enhancing its performance and adding value to its functions.
7. Looping back from a later phase to an earlier one may occur if the need arises.

Each phase has a distinct set of unique development activities. Some of these activities may span more than one phase. The management activity tends to be similar among all phases.

The SDLC is not standardized and may be unique to a given organization. In other words, the names and number of phases may differ from one SDLC to the next. However, the SDLC discussed here is, to a large extent, representative of what is typically adopted by organizations.

At each phase certain activities are performed; the results of these activities are documented in a report identified with that phase. Management reviews the results of the phase and determines if the project is to proceed to the next phase.

The first two phases of the SDLC process constitute the systems-analysis function of a business situation. The following discussion will concentrate on phase one (Preliminary Investigation) and phase two (Requirements Definition) of the outlined SDLC process.

PRELIMINARY INVESTIGATION

The first phase of the systems development life cycle is preliminary investigation. Due to limited resources an organization can undertake only those projects that are critical to its mission, goals, and objectives. Therefore, the goal of preliminary investigation is simply to identify and select a project for development from among all the projects that are under consideration. Organizations may differ in how they identify and select projects for development. Some organizations have a formal planning process that is carried out by a steering committee or a task force made up of senior managers. Such a committee or task force identifies and assesses possible computer information systems projects that the organization should consider for development. Other organizations operate in an ad hoc fashion to identify and select potential projects. Regardless of the method used, and after all potential projects have been identified, only those projects with the greatest promise for the well-being of the organization, given available resources, are selected for development.

The objective of the systems-investigation phase is to answer the following questions: What is the business problem? Is it a problem or an opportunity? What

are the major causes of the problem? Can the problem be solved by improving the current information system? Is a new information system needed? Is this a feasible information system solution to this problem?

The preliminary-investigation phase sets the stage for gathering information about the current problem and the existing information system. This information is then used in studying the feasibility of possible information systems solutions.

It is important to note that the source of the project has a great deal to do with its scope and content. For example, a project that is proposed by top management usually has a broad strategic focus. A steering committee proposal might have a focus that covers a cross-function of the organization. Projects advanced by an individual, a group of individuals, or a department may have a narrower focus.

A variety of criteria can be used within an organization for classifying and ranking potential projects. For planning purposes, the systems analyst—with the assistance of the stakeholders of the proposed project—collects information about the project. This information has a broad range and focuses on understanding the project size, costs, and potential benefits. This information is then analyzed and summarized in a document that is then used in conjunction with documents about other projects in order to review and compare all possible projects. Each of these possible projects is assessed using multiple criteria to determine feasibility.

FEASIBILITY STUDY

The feasibility study investigates the problem and the information needs of the stakeholders. It seeks to determine the resources required to provide an information systems solution, the cost and benefits of such a solution, and the feasibility of such a solution. The analyst conducting the study gathers information using a variety of methods, the most popular of which are:

- Interviewing users, employees, managers, and customers.
- Developing and administering questionnaires to interested stakeholders, such as potential users of the information system.
- Observing or monitoring users of the current system to determine their needs as well as their satisfaction and dissatisfaction with the current system.
- Collecting, examining, and analyzing documents, reports, layouts, procedures, manuals, and any other documentation relating to the operations of the current system.
- Modeling, observing, and simulating the work activities of the current system.

The goal of the feasibility study is to consider alternative information systems solutions, evaluate their feasibility, and propose the alternative most suitable to the organization. The feasibility of a proposed solution is evaluated in terms of its components. These components are:

1. Economic feasibility—the economic viability of the proposed system. The proposed project's costs and benefits are evaluated. Tangible costs include fixed and variable costs, while tangible benefits include cost savings, increased revenue, and increased profit. A project is approved only if it covers its cost in a given period of time. However, a project may be approved only on its intangible benefits such as those relating to government regulations, the image of the organization, or similar considerations.
2. Technical feasibility—the possibility that the organization has or can procure the necessary resources. This is demonstrated if the needed hardware and software are available in the marketplace or can be developed by the time of implementation.
3. Operational feasibility—the ability, desire, and willingness of the stakeholders to use, support, and operate the proposed computer information system. The stakeholders include management, employees, customers, and suppliers. The stakeholders are interested in systems that are easy to operate, make few, if any, errors, produce the desired information, and fall within the objectives of the organization.

REQUIREMENTS DEFINITION

This phase is an in-depth analysis of the stakeholders' information needs. This leads to defining the requirements of the computer information system. These requirements are then incorporated into the design phase. Many of the activities performed in the requirements definition phase are an extension of those used in the preliminary investigation phase. The main goal of the analyst is to identify what should be done, not how to do it. The following is a discussion of the activities involved in requirements definition.

INFORMATION NEEDS OF THE STAKEHOLDERS. Analysis of the information needs of the stakeholders is an important first step in determining the requirements of the new system. It is essential that the analyst understands the environment in which the new system will operate. Understanding the environment means knowing enough about the management of the organization, its structure, its people, its business, and the

current information systems to ensure that the new system will be appropriate.

THE CURRENT INFORMATION SYSTEM. A comprehensive and detailed analysis of the current system is essential to developing a quality, new information system. The analyst should understand and document how the current system uses hardware, software, and people to accept and manage input data and to convert such data into information suitable for decision making. The documentation should be detailed and complete. For example, the analyst should assess the quality of input and output activities that form the user's interface. In addition, the volume and timing of such activities may be documented.

THE CAPABILITIES OF THE NEW COMPUTER INFORMATION SYSTEM. Functional requirements include the necessary hardware and software configurations along with the appropriate human resources. Specific functional requirements often include the following:

- User interface requirements—the input and output needs of the user that must be provided for by the new computer information system. These needs include layouts and definitions of input and output, volume, frequency, origination of input, and destination for reports.
- Processing requirements—the activities required for converting input into output, including calculations, decision rules, database operations, and other processing operations. In addition, requirements concerning capacity, throughput, turnaround time, response time, and the system's availability time are established.
- Storage requirements—the organization, content, and size of databases, and types and frequency of updates and inquiries. Furthermore, backup procedures and the length of time and rationale for retention of backups are delineated.
- Control requirements—the accuracy, validity, security, and adaptability requirements for the system's input, processing, output, and databases. Crash recovery and auditing requirements of the organization are further specified in this stage.

The analysis team, at the end of this phase, produces a document containing the functional requirements of the new computer information system. Additionally, the document contains preliminary schedules and a budget for the next phase. The task force or committee responsible for the project studies the document for the purpose of approving or not approving the work of the analysis team. In addition, the analysis team provides the committee with a demonstration. In

essence, the analysis team walks the committee members, step by step, through the requirements definition phase. If the committee approves this phase, then the analysis team is funded and given the go-ahead to proceed to the next phase. However, if the committee does not approve this phase, then either the project is canceled or, after appropriate modifications, the analysis team resubmits a new document to the committee.

A walk-through starts with a description of the project. From this point, the analysts delineate a set of well-defined goals, objectives, and benefits of the computer information system. Following that, the budgets and staffing requirements are articulated and the plans are shared with the committee. Specific, planned tasks are compared to actual accomplishments, and deviations, if any, are noted and accounted for. The plans for asset protection and business control are reviewed with the committee members. Finally, the analysts seek the committee's approval of the objectives, plans, time table, and budget for the next phase—systems design.

In summary, systems analysis is an essential starting point in the development of computer information systems projects. An organization generally follows a development pattern set up to meet its needs. Regardless of which methodology an organization uses, the objective of systems analysis is to fully understand the current environment and future requirements of a computer information systems project.

SEE ALSO: Business Process Reengineering; Data Processing and Data Management; Management Information Systems; Open and Closed Systems; Systems Design

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SYSTEMS DESIGN

A system can be defined in several ways, including: (1) a set of interrelated parts that function as a whole to achieve a common purpose; (2) a piece of software that operates to manage a related collection

of tasks; or (3) a design for an organization that perceives sets of processes as a related collection of tasks.

Systems can be open or closed. An open system is one that interacts with the external environment; a closed system has no external interactions. A system is normally thought to have inputs, outputs, and a transformation process by which the inputs are transformed to the desired outputs. The majority of systems are open, requiring interaction with the environment for the source of inputs and the destination for outputs.

Almost any collection of related items or tasks that take inputs and produce outputs can be characterized as a system. This also allows for subsystems that are contained by the suprasystem. For example, an airplane can be conceived of as a system. The airplane takes fuel, oxygen, and passengers at one point and transforms the fuel and oxygen to a motive force, thus transforming the passengers from people who wanted to travel to people who have arrived. However, an airplane is made up of many subsystems, such as the engine that takes the fuel inputs and the cargo area that accepts passengers. Individually, either of these two subsystems can function, but together they produce an output that is greater than the sum of the outputs from the two subsystems. In many cases, as in the one described here, systems and subsystems are mutually dependent for their survival, or their utility.

Subsystems need to communicate in order for the suprasystem to function effectively. The subsystems therefore require common language(s) for system integration. Language is of the utmost importance in system integration. This connects systems theory and information theory.

Normally, systems are shown as having a feedback loop. An adaptation from engineering control systems, this requires systems that are automatically controlled to have a feedback loop in order to direct the correction of inputs to result in the correct outputs. In organizational development theory, this feedback loop can be conceived of as business results, consumer comments, or market information.

For example, a thermostat is a simple system. The thermostat takes the temperature of the room as an input. If the temperature is below the set point, the furnace comes on to heat the room. As the room heats, the temperature that is read into the thermostat is compared against the set point. Once the room temperature reaches the set point, the furnace turns off. The input for this system is the room temperature. The transformation process is the heating of the room. The output is the warmed room. The feedback loop is the constant temperature measurement comparison to the set point.

HISTORY

In the late 1940s Norbert Wiener's *Cybernetics* set the stage for later development of the ideas of systems theory. In 1955, using ideas that were developed from the biological sciences, Bertalanffy, Hempel, Bass, and Jonas wrote a seminal work on systems theory that presented the activities that occur within a corporation as being similar to a biological system. This was a dramatic shift from the mechanistic way of conceptualizing organizational activities that was popular during the first half of the twentieth century. In 1956 Kenneth E. Boulding presented an addition to systems theory that classified systems into hierarchies. He called this the hierarchy of levels. The hierarchy of levels indicated that systems are composed of a collection of systems that operate in a hierarchical manner. More recently, Wendell L. French and Cecil H. Bell offered a list of systems into which the typical organization can be separated, and the concept of systems was used for the development of business process reengineering activities, as described by Michael Hammer and James Champy.

SYSTEMS DESIGN AND DEVELOPMENT

Systems theory can be helpful in analyzing business processes and finding inefficiencies. Business processes can include a set of elements such as a purchasing agent, a supplier, the customer orders that request a part, and the final product that uses the part. Analyzing how well this system functions across functional lines can help reduce non-value-added activities such as cyclical flows of paperwork and unnecessary cross-checking for accuracy. Many systems such as the one described develop over time without a great deal of effort to design or develop systems with efficiency. They become cumbersome due to stop-gap solutions that increase the number of steps, circular flows, and a variety of other non-value-added activities that are usually implemented to minimize errors or solve a problem in service. As a company grows, these stop-gap fixes can cause bottlenecks and delays in the process. At times, the original purpose of the measure is forgotten or even becomes obsolete, but the process is performed this way by employees who do not understand the system and its goals.

Systems within companies are often not readily apparent because they cross functional borders, geographical borders, and hierarchical borders. Employees within the system can therefore be blind to the impact of their activities on the end result of the system. At times, they may not even be aware of the result itself, but simply their piece of the activity. In systems design, therefore, it is often necessary to look across these borders to identify the key activities of the system and eliminate paperwork or other activities that only serve to reduce overall productivity.

BUSINESS PROCESS REENGINEERING. Business process reengineering (BPR) was begun to help companies overcome these artificial barriers and see the whole system as a process that produces an end product, such as a bill, a satisfied customer, or a well-designed product. The popularity of BPR has waned somewhat because of the high number of failures to produce the promised results. In 1999 Hammer and Champy admitted that about 70 percent of the BPR efforts undertaken do not result in success.

BPR is the identification, analysis, and redesign of systems within a corporation in order to improve the efficiency of the operations. Much of the focus of BPR has been on the elimination of labor and employees, often at a fast pace. This has resulted in the phenomenon of downsizing. Downsizing is meant to eliminate all non-value-added activities as well as all nonessential employees of the system under evaluation. This concept attracted enthusiastic adherence in the early 1990s. However, it left some internal corporate systems changed with the expectation of improved efficiency, but the result was less than favorable. The interaction of other systems had been neglected in the analysis, as was sufficient time to retrain employees to adapt to the new system. The phenomenon of rehiring fired employees as consultants to keep the business running effectively was a direct result of over-enthusiastic downsizing. This, of course, reduced the expected savings and efficiencies, thus reducing the effectiveness of business process reengineering overall.

EXAMINING A SYSTEM. Systems design requires that all elements of the system be identified: inputs, outputs, feedback, and transformation. In addition, it is important to recognize that an organization consists of many different systems, all of which interact, and that the transitions between systems can be particularly difficult to manage. The use of systems design allows the compartmentalization of processes into understandable and measurable systems that can then be diagnosed, redesigned, and implemented. This is of great value to complex organizations that are seeking greater efficiency and profitability.

For example, the system of product delivery—including order receipt, production, materials acquisition, packaging, quality control, and delivery—can be seen as a separate system from the human resources system—which consists of the interviewing, hiring, training, development, and release of employees—although the two systems certainly interact. However, analysis of the efficiencies of the human resources system can be conducted separately from analysis of the efficiencies of the product delivery system. Separating the system into its component parts can assist in the diagnosis of problems in a system. For example, hiring employees is an input to the human resources system, the training and development is the

transformation, and the release of employees through retirement, layoffs, or firing is an output, as is the delivery of trained and qualified workers.

It is one thing to conceive of an organization as the total system containing various subsystems in the abstract; in practice, however, identifying the suprasystem and the subsystems has no convention and depends entirely upon the arbitrary perspective of the observer. French and Bell identify five subsystems of a corporation that may be considered generic and applicable to most business entities. These five subsystems are technological, task, structural, human-social, and the external interface subsystems. Other observers might identify more subsystems in a completely different manner.

Simply stated, the diagram of a system can be separated into subsystems by tracing a line around the boundaries of related activities that have a common goal. The items that cross the boundary are then considered either inputs or outputs.

VALUE-ADDED AND NON-VALUE-ADDED ACTIVITIES. Systems design requires that one consider the value-added activities and minimize the non-value-added activities. Value-added activities are those that directly affect the product or service, such as assembly or delivery of a package. Non-value-added activities include such things as quality testing and writing a receipt. Normally this requires a cross-functional team that can examine the interfaces over which the system extends and ensure that these “hand-offs” occur efficiently. Various tools are used to develop a system, and several varieties of flow charts and diagrams can be used to develop a visual representation of the system. Team members may then analyze and discuss the activities represented on the flow chart and evaluate whether they are essential or can be minimized or eliminated.

Oftentimes, this is not immediately evident. For example, perhaps accounting policy once required that the account manager be called every time an order came in from a particular company with a spotty payment history. Over time, the computer systems were upgraded to check customer credit and whether a customer was current on its bills. At this point, the call to the account manager could have been eliminated. However, the customer service agent trained to call the account manager does not realize that these checks are occurring. The account manager receiving the calls may consider them important or trivial, but does not realize that at one time the calls were made to prevent over-selling to unreliable customers. During a discussion and analysis of this system, these two functional representatives should find that this activity is non-value-adding and, because of the improvements to the computer system, the calls are now completely unnecessary—a fact that may not have been uncovered otherwise.

In systems design, any activity that does not directly add to the value of the product is eliminated while value-added activities are made efficient. The related activities that must be done, as well as the activities that aid in the accounting, documentation, or delivery of the product, are examined together.

SYSTEM DEVELOPMENT. System development can be the development of a new system or improvement of an existing system. This can be approached much the same as system design and with much the same tools. However, current employees must be included in the development process and retrained to understand and help with the implementation. In addition, the goals or set points and the feedback loops are developed at this point in order to guide the system toward proper performance.

SYSTEM IMPLEMENTATION

Implementation of a new system design must include training employees to understand the new system and their role in achieving the goals the company has for it. Implementation times can vary depending upon the complexity of the system being implemented.

Computer systems have been developed to help organizations conduct, control, and document related tasks more efficiently. In this case, the design and development requires a study of the system to be modeled or controlled by the computer. Software and hardware are then acquired or developed to effectively handle the tasks. Implementation requires a verification stage that tests the computer system prior to actual use to verify that the system operates as envisioned. Modifications to fit the needs of the corporation are usually made over time as problems are identified with use. These systems tend to be expensive and development often requires significant effort to correctly handle the complexities of each individual company. Some computer systems can be purchased off the shelf that handle such typical tasks as accounting, inventory control, or transportation. Some of these are even developed for a particular industry. However, most off-the-shelf products still require technical modification to fit the needs of the individual company.

It should be apparent that computer systems closely parallel the organizational systems previously discussed. In this sense the two definitions are related, but not the same.

SEE ALSO: Business Process Reengineering; Open and Closed Systems; Systems Analysis

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T

TASK ANALYSIS

The definition of task analysis varies depending on the purpose for it and the context in which it is performed. Similarly, purposes for conducting task analyses vary, from using the process as an aid in designing job descriptions to using it to develop effective tools for human-computer interaction (e.g., analyzing user needs and behaviors to develop software). David H. Jonassen et al describe five general classes of task analysis: job or performance analysis, learning analysis, cognitive task analysis, content or subject-matter analysis, and activity-based methods, which is a relatively new category of the task-analysis discipline. Each approach requires different methods. In many cases, however, task analysis can most simply be described as the division of activity into its specific component levels in order to determine the value in solving particular performance problems.

Task analysis is a way of assessing what people, machines, or a combination thereof do and why they do it. Analyses examine how and where specific information flows, how it is modified at various stages (what is done to the information), who performs those modifications (a computer or person), and whether he, she, or it is the appropriate vehicle for efficient and effective completion of those tasks.

Task analysis is also studied in relation to group support systems (GSS). This type of analysis does not focus on the study of all tasks, but on those tasks typically encountered in organizational decision-making groups. Often such analysis is conducted in an effort to discern how the introduction of new elements, such as technology, can facilitate more effective group functioning and decision making.

Some workplaces emphasize tasks so heavily that they can be considered task environments, or may operate under task management. A task environment views tasks as behavior requirements. Required behaviors vary with the task(s) to be performed, and those tasks influence behavior in that each task is characterized by its purpose, that is, what group members must do to accomplish a certain task (e.g., creative tasks require that a group generates ideas). Behavior determination for each task includes deciding what needs to be accomplished and how each goal should be met. Leaders in these organizations focus on managing the work that needs to be performed, and they expect employees to fall in line behind them in order to meet the prescribed goals. More specifically, the leaders manage procedures for coordinating the sequence of procedures and materials for the completion of specific tasks. These types of situations provide much fodder for research into group support systems and organizational behavior.

ORIGINS OF TASK ANALYSIS

Task analysis has been studied almost since the Industrial Revolution, during which employers began to focus on breaking down jobs into the specific tasks required. One of the first true leaders of task analysis was Frederick Winslow Taylor, the author of *The Principles of Scientific Management*, first published in 1911. Taylor applied critical thinking to industry, seeking the most efficient way to perform tasks and/or jobs and rewarding workers who found ways to facilitate working toward that goal.

Taylor's theories were a precursor to Jonassen's first classification of task analysis: job or performance analysis. Originally meant to describe the simple

behaviors performed on the job, analysis of this sort also became used as a way to plan technical training. During the 1950s and 1960s subject-matter analysis began to be used to plan curricula in educational facilities. This involved analyzing content into its most basic constructs and determining how they relate to other subject matter. The 1960s led to another revolution in learning psychology, and thus, to another form of analysis: learning analysis. This movement focused on people who learned processed information as they performed certain tasks. Cognitive task analysis evolved from this class, as did research in human-computer interaction. Finally, activity analysis studies how people perform in natural surroundings and which social and contextual factors affect that performance.

Task analysis was studied in organizational literature and as part of the group process in the mid- to late-1960s. Scholars of group behavior felt that tasks undertaken as part of the group process played particularly important roles in how group members interacted and performed. Group support systems (GSS) literature also emphasized the importance of tasks and, from the mid-1980s to the mid-1990s, developed a task classification scheme that has since been widely used. In the late 1990s theories were explored as to how tasks and technology worked together within GSS. The theory asserts that clear descriptions of tasks are an important part of any GSS environment, and that technology is linked specifically to the demands of the tasks to be performed.

MARKETPLACE TRENDS

The use of task analysis across various market segments is growing. Computer-supported cooperative work (CSCW) and GSS continue to increase in importance with the need to support interdisciplinary collaboration, telecommuting, and cultural challenges in the global workplace. The use of task analysis is making its way into the military as well. As described in an article by Pezzano and Burke in *Defense AT&L*, the U.S. Army used task analysis to identify requirements, increase flexibility, and reduce risk in maturing technological systems.

In the fields of occupational and organizational psychology, cognitive task analysis is being used in two ways. In the healthcare field, occupational therapists work to identify how people approach everyday tasks in order to better help patients learn to perform tasks. On a more organizational level, researchers examine the cognitive activity behind complex task performance to better train workers and design or improve manufacturing systems. The goal in these studies is to reduce error and mitigate risk in work settings. This is also referred to as “process tracing.” While no dominant methodology has evolved yet for

this emerging trend, models are being developed and proposed as the popularity of the technique continues to grow.

DEFINING DATA AND ACTIVITY FLOW

A major part of task analysis is defining the data or information processed in an organization, as well as the flow of that organization’s activity. This analysis helps an organization better understand its practices. Many professionals clarify ideas through the use of data-flow diagrams and activity-flow diagrams. Data-flow diagrams provide detail on information—where it goes and when, and which unit of a system handles it at which point. Activity-flow diagrams provide detail on the data processing and a system’s communication needs.

DATA-FLOW DIAGRAMS

Specific elements included on data-flow diagrams (DFDs) include outside units such as customer needs, inside units such as the employees who actually manipulate data, and whether a data element inputs to an element or reads from an element. Data storage areas are also indicated on DFDs. Data-flow diagrams can be designed to illustrate existing processes as well as to document better and even ideal situations. Each type of element is denoted within a prescribed symbol (e.g., rectangles signify outside units) so that a simple glance at the chart is enough to differentiate each element.

DFDs are helpful in that they show exactly how data flow is initiated and by whom, who or which system receives the data, and what they do to the data. Diagrams can also be annotated to show the volume and frequency with which these changes occur. However, data-flow diagrams do not show specific processing details, nor are they a helpful representation of how the process fits onto a timeline.

ACTIVITY-FLOW DIAGRAMS

Activity-flow diagrams (AFDs) keep track of the people or systems that use data or information, and the time sequence in which that occurs. Activity-flow diagrams are similar to flow charts, with a special language and symbols specific to their purpose. They also note any activities that involve the transformation of data or materials.

Activities included on AFDs include the following:

1. Transportation of information—physically moving information from one place to the next. No transformation of data takes place.
2. Information transformation—changing information from one medium to another. The

location and content of that data does not change.

3. Algorithmic processing—sorting incoming data and making decisions about the information according to pre-programmed rules.
4. Judgmental processing—sorting information according to multiple, more complex dimensions than algorithmic processing may be capable of.
5. Correlating information—retrieving information from several sources and merging several aspects of each to form a new record.
6. Information analysis—looking for patterns, projections, and trends in the treatment of data.
7. Negotiation—persuading, teaching, and learning. It involves using more complex judgment and interpersonal communication.
8. Information generation—organizing, synthesizing, and adding new information.

The purpose of AFDs is to look for efficiencies and prescribe support in the most appropriate and effective way possible where it is lacking. Support may be required in a human capacity, or technological systems may be available to automate or support some activities. Processes are allocated to computers and/or personnel according to what each does best and what best suits the needs of the specific processes. Various options are analyzed using cost/benefit analysis, but tend to follow some general conditions:

- Data transport, transformation, and algorithmic processing can be highly automated.
- Judgment processing and correlation can be supported by technology.
- Analysis and creation of data requires human effort.

SEE ALSO: Human Resource Management; Job Analysis; Strategic Planning Tools

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TEAMS AND TEAMWORK

A team is a collection of individuals organized to accomplish a common purpose, who are interdependent, and who can be identified by themselves and observers as a team. Teams exist within a larger organization and interact with other teams and with the organization. Teams are one way for organizations to gather input from members, and to provide organization members with a sense of involvement in the pursuit of organizational goals. Further, teams allow organizations flexibility in assigning members to projects and allow for cross-functional groups to be formed.

TYPES OF TEAMS

There are six major types of teams: informal, traditional, problem solving, leadership, self-directed, and virtual. Table 1 describes some of the characteristics of these six types of teams.

INFORMAL TEAMS. Informal teams are generally formed for social purposes. They can help to facilitate employee pursuits of common concerns, such as improving work conditions. More frequently however, these teams form out of a set of common concerns and interests, which may or may not be the same as the organization's. Leaders of these teams generally emerge from the membership and are not appointed by anyone in the organization.

TRADITIONAL TEAMS. Traditional teams are the organizational groups commonly thought of as departments or functional areas. Leaders or managers of these teams are appointed by the organization and have legitimate power in the team. The team is expected to produce a product, deliver a service, or perform a function that the organization has assigned.

Table 1
Six Types of Teams

Informal
<ul style="list-style-type: none"> • Social in nature • Leaders may differ from those appointed by the organization
Traditional
<ul style="list-style-type: none"> • Departments/functional areas • Supervisors/managers appointed by the organization
Problem-Solving
<ul style="list-style-type: none"> • Temporary teams • Frequently cross-functional • Focused on a particular project
Leadership
<ul style="list-style-type: none"> • Steering committees • Advisory councils
Self-Directed
<ul style="list-style-type: none"> • Small teams • Little or no status differences among team members • Have authority to decide how to get the work done
Virtual
<ul style="list-style-type: none"> • Geographically spread apart • Meetings and functions rely on available technology

PROBLEM SOLVING TEAMS. Problem-solving teams or task forces are formed when a problem arises that cannot be solved within the standard organizational structure. These teams are generally cross-functional; that is, the membership comes from different areas of the organization, and are charged with finding a solution to the problem.

LEADERSHIP TEAMS. Leadership teams are generally composed of management brought together to span the boundaries between different functions in the organization. In order for a product to be delivered to market, the heads of finance, production, and marketing must interact and come up with a common strategy for the product. At top management levels, teams are used in developing goals and a strategic direction for the firm as a whole.

SELF-DIRECTED TEAMS. Self-directed teams are given autonomy over deciding how a job will be done. These teams are provided with a goal by the organization, and then determine how to achieve that goal. Frequently there is no assigned manager or leader and very few, if any, status differences among the team members.

These teams are commonly allowed to choose new team members, decide on work assignments, and may be given responsibility for evaluating team members. They must meet quality standards and interact

with both buyers and suppliers, but otherwise have great freedom in determining what the team does. Teams form around a particular project and a leader emerges for that project. The team is responsible for carrying out the project, for recruiting team members, and for evaluating them.

VIRTUAL TEAMS. Technology is impacting how teams meet and function. Collaborative software and conferencing systems have improved the ability for employees to meet, conduct business, share documents, and make decisions without ever being in the same location. While the basic dynamics of other types of teams may still be relevant, the dynamics and management of virtual teams can be very different. Issues can arise with a lack of facial or auditory clues; participants must be taken at their word, even when video-conferencing tools are used.

Accountability is impacted by taking a team virtual. Each member is accountable for their tasks and to the team as a whole usually with minimal supervision. Key factors in the success of a virtual team are effective formation of the team, trust and collaboration between members, and excellent communication.

CHARACTERISTICS OF EFFECTIVE TEAMS

Some characteristics of effective teams are clear direction and responsibilities, knowledgeable members, reasonable operating procedures, good interpersonal relationships, shared success and failures, and good external relationships.

CLEAR DIRECTION. Clear direction means that the team is given a clear and distinct goal. The team may be empowered to determine how to achieve that goal, but management, when forming the team, generally sets the goal. A clear direction also means that team outcomes are measurable.

CLEAR RESPONSIBILITIES. Clear responsibilities means that each team member understands what is expected of her or him within the team. The roles must be clear and interesting to the team members. Each team member needs to be able to rely on all the other members to carry out their roles so that the team can function effectively. Otherwise, one or two team members come to feel that they are doing all the work. This is one of the reasons so many individuals are initially reluctant to join teams.

KNOWLEDGEABLE MEMBERS. An effective team will be comprised of individuals who have the skills and knowledge necessary to complete the team's task. Cooperation is essential at an early stage in inventorying the skills and knowledge each member brings to the team, and working to determine how to utilize those skills to accomplish the team task.

REASONABLE OPERATING PROCEDURES. All teams need a set of rules by which they operate. Sports teams for example, operate according to a clearly laid-out set of rules about how the game is played. Similarly, work teams need a set of procedures to guide meetings, decision making, planning, division of tasks, and progress evaluation. Setting, and sticking to, procedures helps team members become comfortable relying on one another.

INTERPERSONAL RELATIONSHIPS. Teams are composed of diverse individuals, each of whom comes to the team with his or her own set of values. Understanding and celebrating this diversity helps to make a stronger, more effective team.

SHARING SUCCESS AND FAILURES. Everyone wants to feel appreciated. Within a team, members should be willing to express their appreciation, as well their criticisms, of others' efforts. Similarly, the organization must be willing to reward the team for successful completion of a task and hold all members responsible for failure.

EXTERNAL RELATIONSHIPS. In the process of building a strong team, groups external to the team are frequently ignored. In order for the team to successfully complete its task, it cannot operate in isolation from the rest of the organization. Teams need help from people within the organization who control important resources. Establishing clear lines of communication with these people early on will facilitate the completion of the team's task.

TEAM BUILDING

The most successful teams go through five stages of development. Table 2 outlines these stages.

Table 2	
Five Stages of Team Development	
Forming	
•	Assess the ground rules
•	Gather information about group goals
Storming	
•	Initiate conflict with other team members
•	Find mutually acceptable resolutions
Norming	
•	Build cohesion
•	Develop a consensus about norms
Performing	
•	Channel energy toward the task
•	Apply problem-solving solutions generated in the previous stages
Adjourment	
•	Disengagement after successful completion of goals
•	Regrets at team break-up

FORMING. Forming is the stage when team members become acquainted with one another. They also assess the group task and the ground rules that will apply to that task. At this stage everyone is typically very polite and willing to go along with suggestions made by other team members. Team members try to avoid making enemies and are frequently more patient with one another than they might be later in the process.

STORMING. As the novelty of being a member of the team wears off, conflict emerges. Members of the team emerge who want to exert greater influence over the process. Leadership struggles begin, as do interpersonal conflicts. Conflicts erupt over the task requirements and the best way to achieve that task. This is the stage at which listening and finding mutually acceptable resolutions to the conflict is most important. The team can either emerge united and ready to take on the assigned task, or divided, with some members taking a passive role.

NORMING. In the norming stage team members make an effort to discover what standards of performance are acceptable. What do deadlines really mean? How high a level of quality is necessary? Does every member have to be at every meeting? What about developing sub-teams? If the team can establish harmonious relationships at this stage, they are ready to move on to the performing stage. Some teams, however, disband at this stage.

PERFORMING. At this stage the team is ready to be productive and work on the task assigned. Team members' roles have been established and clarified. Group interaction should be relatively smooth as the team applies some of the problem-solving skills it learned in earlier stages to the task at hand. If the team has reached this stage without successfully working through the problems and issues of the earlier stages, it may disband or regress and work through those issues.

ADJOURNMENT. At some point almost all teams are disbanded, whether their task is completed or a team member leaves. On the one hand this can be a happy stage, with members congratulating one another on a job well done. On the other hand adjournment means the disruption of working arrangements that may have become comfortable and efficient, and possibly the end of friendships.

SELECTING THE TEAM MEMBERS

Forming an effective team is more complex than simply throwing a group of people together, assigning them a task, and hoping for the best. Potential team members need to be interviewed and their skills and knowledge should be assessed. Issues to consider in selecting team members include: the individual's motivation with respect to both the team and the task at hand; the attitudes and goals of potential team members;

potential problems with intragroup relationships; and potential problems with relationships with external groups.

The organization needs to first assess what the skills, knowledge, and attitudes of potential team members should be. What are the tasks that need to be accomplished for the team to be successful? Have managers analyzed the jobs and developed an inventory of required skills and knowledge?

Once these steps have been completed, potential team members can be interviewed. Among the issues the interview process should cover are:

- What strengths does the individual bring to the team?
- What is she or he willing to work on improving?
- What problem solving style does the individual employ?
- Can she or he share information in an effective manner?
- Does the individual have good listening skills?
- Can the individual provide constructive feedback?

It is important to remember that effective teams are generally made up of a variety of personalities. The selection process needs to be structured so that it is not biased toward one personality type. An effective team needs both the thoughtful, detail-oriented individuals, as well as the outgoing, insightful individuals.

Additional considerations for building an effective team are being identified. There are four important factors to consider when selecting team members:

1. years of professional work experience;
2. frequency of team participation;
3. type of team training;
4. situational entry to team assignments (volunteered, assigned, requested).

These factors can be effectively utilized by management when selecting team members to increase the opportunity for overall success.

ORGANIZATIONAL BENEFITS OF TEAMS

The major impetus for organizations to embrace the team concept is the effort to improve productivity and quality. Teams are a key component of many total quality management programs. The QS 9000 program, which suppliers to the major automobile manufacturers have embraced, relies on the team approach to ensure quality while maintaining a low-cost approach to manufacturing.

In addition to improved productivity and quality, some of an organization's major benefits from the use of teams are improved quality of work life for employees, reduced absenteeism and turnover, increased innovation, and improved organizational adaptability and flexibility. Effective implementation of teams can also improve office politics by improving the communication and trust between the team members.

IMPROVED QUALITY OF WORK LIFE. Effective teams frequently improve the quality of work life for the employees. An effective team is generally one in which members are empowered to make decisions about how to get work done. Giving team members authority and control over the work processes reduces the amount of external control and increases the sense of ownership and accountability for the work being done. This helps to create a satisfying and rewarding work environment.

LOWER ABSENTEEISM AND TURNOVER. A satisfying and rewarding work environment helps to lower absenteeism and turnover. Teams are particularly effective in this area. Membership in a work team gives an employee a sense of belonging, interaction with others on a regular basis, and recognition of achievements. All of these help to eliminate a sense of isolation within the organization. Team members identify with and feel pride in the work they are doing and come to rely on one another being there. At some companies, employees are evaluated based on their contribution to their team's efforts.

INCREASED INNOVATION. W.L. Gore & Associates is an excellent example of a firm that utilizes the team concept and has a strong record of innovation. Gore is a multinational company structured around the concept of small plants (no more than 250 employees) where everyone works in teams. Everyone is allowed to experiment with the products and develop new uses. The result is that Gore has a continuous stream of patent applications and has been successful in developing new products in areas as diverse as clothing, surgical supplies, and coatings for industrial use.

ORGANIZATIONAL ADAPTATION AND FLEXIBILITY. During the 1980s Ford was able to reduce its automobile design cycle by implementing Team Taurus. Through the early involvement of employees from planning, designing, engineering, and manufacturing, the company was able to eliminate some of the bottlenecks that had delayed the design process. The involvement of suppliers and assembly workers helped to decrease the number of parts involved and lower costs. Reducing the time from design to manufacture helped Ford to be more responsive to market changes and increase its market share in the 1980s and '90s.

Teams are not appropriate for all organizations or in all types of businesses. Behavioral scientists are still working to determine exactly when teams will be most

effective, what motivates team members, what types of business can best benefit from the implementation of teams, and so on. The study of the philosophy and psychology of teamwork is still in its infancy. While effective teams can produce extraordinary results, studies have found that an estimated 50 percent of self-directed work teams culminate in failure.

The introduction of effective and stable new technologies has greatly affected teams and teamwork. Collaborative software and other multimedia options are providing businesses with tools to conduct teamwork regardless of location or time. New issues of accountability, team structure, and team selection are arising for management to deal with and coordinate within the businesses overall goals and objectives.

But as more and more businesses introduce the team concept, the wrinkles in the process are being ironed out and team popularity is growing. An increasing number of organizations are using teams to improve productivity and quality, and to solve a range of managerial problems.

Improved quality of work life and a reduction in absenteeism and turnover all contribute to a positive impact on the bottom line. Involving employees in teams helps the organization remain open to change and new ideas. As long as teams are seen as a means of improving the organization's ability to meet competitive challenges, teams will be part of the business world.

SEE ALSO: Empowerment; Group Dynamics; Participative Management

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TECHNOLOGICAL FORECASTING

Forecasting is defined by B.R. Martin as "the process involved in systematically attempting to look into the longer-term future of science, technology, the economy and society with the aim of identifying the areas of strategic research and emerging generic technologies likely to yield the greatest economic and social benefits."

Numerous techniques for forecasting technological developments were pioneered in the 1960s in both business and government (particularly military) applications, and the term "foresight studies" is now commonly used. The more important of the techniques are described here.

THE S-SHAPED LOGISTIC CURVE

The growth of a new technological capability typically follows an S-shaped curve that can be divided into three stages. The first is slow initial growth, as the new technology has to prove its superiority over existing technologies. Once this is demonstrated, a period of rapid growth follows. Finally, its growth is limited by technological or socioeconomic factors and levels off toward some upper limit. The commercially successful exploitation of technology often depends upon the astute perception and exploitation of this growth. Thus, forecasters pay significant attention to extrapolating the growth of the S-shaped curve of a technological capability at some relatively early stage of its life. In so doing, they use mathematical functions or models.

ENVELOPE CURVES AND TREND EXTRAPOLATION

Technological evolutions typically progress through successive generations of capabilities (e.g. 286, 386, 486, and Pentium microprocessors) and, as each capability is superseded by its technologically superior successor, overall functional performance continues to rise along an envelope curve generated by successive S-curves. This envelope curve defines a trend against time, which may be extrapolated forward to predict future capabilities.

Richard Foster focuses general management attention upon the importance of identifying S-curves

while, for the mathematically sophisticated reader, Meade and Islam provide a critique of the relative merits of some of the numerous technological techniques available.

DELPHI METHOD

The Delphi method and its extensions provide the backbone of foresight studies. This method was originally funded by the U.S. Air Force and later developed by Olaf Helmer and coworkers at the Rand Corporation. It derives its name from the Oracle of Delphi, who was the prime source of prophecy in ancient Greece. The method is based upon the premise that the best sources of technological forecasts are the opinions of experts in the given technology. That is, the simplest way of making a forecast is to ask the experts in the field to do it. It is undesirable to base a forecast on a single oracle or expert, however distinguished, so the opinion of a sample or committee of experts is sought. The considered judgment or consensus of a committee of experts provides a viable approach to deriving a technological forecast, but suffers from the disadvantage that it may be biased toward the opinions of its dominant members. The Delphi approach avoids this disadvantage by requiring members to participate anonymously.

The Delphi method is usually conducted by one individual, known as the director. The panel's members are selected based upon expertise and availability, security considerations (e.g., commercial or military) and the avoidance of overall bias. Panel members can usually be selected from peer judgments, literature citations, honors and awards, patents, and professional society status. A typical panel consists of between ten and fifty members.

The approach is iterative, with each iteration called a round. In each round the members are interrogated individually and confidentially (usually by questionnaire) for their views on the likelihood and timing of the occurrences of certain future, technological breakthroughs or other events. Direct interactions among panel members is forbidden; this preserves anonymity between panel members, with controlled anonymous feedback. A unique feature of the Delphi method, as noted by Parenté et al, is that it provides feedback from earlier rounds between successive polls. The results of each round are summarized statistically as median-date and interquartile-range responses and circulated among panel members. In the first round, members often differ widely in their judgments, yielding a wide interquartile range. However, as members anonymously exchange the rationales of their judgments in successive rounds a consensus is reached, usually rather quickly—after about four rounds. The director then consolidates the results of this final round, which constitute the reported forecast. The panel's forecasts are usually presented in the form of

the final median dates and interquartile ranges for each of the events considered.

These techniques—the S-shaped logistic curve, envelope curves and trend extrapolation, and the Delphi method—are a primary sampling of the tools used for technological forecasting. Advances in computer technology will continue to provide additional forecasting opportunities for years to come.

SEE ALSO: Futuring; Longitudinal Scenarios; Multiple-Criteria Decision Making

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TECHNOLOGY MANAGEMENT

Technology is a Greek word derived from the synthesis of two words: *techne* (meaning art) and *logos* (meaning logic or science). So loosely interpreted, technology means the art of logic or the art of scientific

discipline. Formally, it has been defined by Everett M. Rogers as “a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome”. That is, technology encompasses both tangible products, such as the computer, and knowledge about processes and methods, such as the technology of mass production introduced by Henry Ford and others.

Another definition was put forth by J. Paap, as quoted by Michael Bigwood in *Research-Technology Management*. Paap defined technology as “the use of science-based knowledge to meet a need.” Bigwood suggests this definition “perfectly describes the concept of technology as a bridge between science and new products.” Technology draws heavily on scientific advances and the understanding gained through research and development. It then leverages this information to improve both the performance and overall usefulness of products, systems, and services.

In the context of a business, technology has a wide range of potential effects on management:

- Reduced costs of operations. For example, Dell Computer Corporation used technology to lower manufacturing and administrative costs, enabling the company to sell computers cheaper than most other vendors.
- New product and new market creation. For example, Sony Corporation pioneered the technology of miniaturization to create a whole new class of portable consumer electronics (such as radios, cassette tape recorders, and CD players).
- Adaptation to changes in scale and format. In the early part of the twenty-first century, companies addressed how small devices such as cell phones, personal digital assistants (PDAs), and MP3 players could practically become, as well as how each product could support various features and functions. For example, cell phones began to support email, web browsing, text messaging, and even picture taking as well as phone calls.
- Improved customer service. The sophisticated package-tracking system developed by Federal Express enables that company to locate a shipment while in transit and report its status to the customer. With the development of the World Wide Web, customers can find the location of their shipments without even talking to a Federal Express employee.
- Reorganized administrative operations. For example, the banking industry has reduced the cost of serving its customers by using technologies such as automated teller machines, toll-free call centers, and the Web. As of early 2005, the cost of a bank transaction

conducted by a human teller was approximately \$2, compared to \$1 for a telephone banking transaction, \$.50-1.00 for an ATM transaction, and about ten cents for banking over the Internet. Automated Clearing House (ACH) or “checkless” check processing costs were \$.25-.50 per transaction. This reduction in cost could be attributed primarily to reduction the amount of labor involved, which had a profound effect on employment and labor-management relations in banking.

Professor Michael Porter of Harvard Business School is one of many business analysts who believe that technology is one of the most significant forces affecting business competition. In his book *Competitive Advantage* (1985), Porter noted that technology has the potential to change the structure of existing industries and to create new industries. It is also a great equalizer, undermining the competitive advantages of market leaders and enabling new companies to take leadership away from existing firms. In a Grant Thornton LLP survey conducted during late 2004, 47 of 100 mid-size manufacturing businesses agreed that innovation had become increasingly important to the industry. As M.F. Wolff reported, corporate strategists were encouraging this by bringing product designers along on customer visits, offering rewards and recognition programs to employees with innovative ideas, including innovation as a priority in business strategies, setting revenue goals attributable to innovation, and looking for “willingness and ability to innovate” when making hiring decisions.

TECHNOLOGY MANAGEMENT

Since technology is such a vital force, the field of technology management has emerged to address the particular ways in which companies should approach the use of technology in business strategies and operations. Technology is inherently difficult to manage because it is constantly changing, often in ways that cannot be predicted. Technology management is the set of policies and practices that leverage technologies to build, maintain, and enhance the competitive advantage of the firm on the basis of proprietary knowledge and know-how.

The U.S. National Research Council in Washington, D.C., defined management of technology (MOT) as linking “engineering, science, and management disciplines to plan, develop, and implement technological capabilities to shape and accomplish the strategic and operational objectives of an organization” (National Research Council, 1987). While technology management techniques are themselves important to firm competitiveness, they are most effective when they complement the overall strategic posture adopted by

the firm. The strategic management of technology tries to create competitive by incorporating technological opportunities into the corporate strategy.

Technology management needs to be separated from research and development (R&D) management. R&D management refers to the process by which a company runs its research laboratories and other operations for the creation of new technologies. Technology management focuses on the intersection of technology and business, encompassing not only technology creation but also its application, dissemination, and impact. Michael Bigwood suggests that New Technology Exploitation (NTE) lies somewhere between R&D and New Product Development, with characteristics of the cyclical learning process of scientific discovery and the more defined and linear process of product development.

Given these trends, a new profession, known as the technology manager, emerged. Defined as a generalist with many technology-based specializations and who possessed new managerial skills, techniques, and ways of thinking, technology managers knew company strategy and how technology could be used most effectively to support firm goals and objectives.

Educational programs supporting this career grew as well. Formal Technology Management programs became available in the 1980s and these were largely affiliated with engineering or business schools. Coursework was limited, and the field was just finding its own unique focus. During the 1990s, the increasing integration of technology into overall business function and strategy helped to align technology management more closely with business programs. Most graduate programs in the 2000s were offered through business schools, either as separate MBA tracks or as MBA concentrations. Coursework in these programs shifted emphasis from technology to management, centering around innovation management and technology strategy, while touching on other areas such as operations, new product development, project management, and organizational behavior, among others. There was still little specialization in any particular industry.

During the early 2000s, another shift took place. Global distribution, outsourcing, and large-scale collaboration impacted the nature of technology management (TM) and preparatory educational programs. At least two MBA programs were shifting their technology management focus to “innovation and leadership,” with particular emphasis on real-world problem solving in partnership with large corporations.

TECHNOLOGY AND INNOVATION

Technological change is a combination of two activities invention and innovation. Invention is the development of a new idea that has useful applica-

tions. Innovation is a more complex term, referring to how an invention is brought into commercial usage. The distinction between the two is very important. As an example, Henry Ford did not invent the automobile; companies in Europe such as Daimler were producing cars well before Ford founded his company. Henry Ford instead focused on the innovation of automobiles, creating a method (mass production) by which cars could be manufactured and distributed cheaply to a large number of customers.

Figure 1 Examples of Technological Innovation and Market Growth

Products chosen by the Centre for Technology Management at the University of Cambridge, for “demonstrating one or more characteristics that assist in the analysis of modern innovation and new product introduction (NPI) processes.”

- Microsoft Xbox
- Sendo mobile phones
- Crest SpinBrush (open innovation - 'connect and develop')
- yet2.com (virtual technology marketplace)
- Disney consumer electronics (brand expression through product design)
- IBM PC (dominant design, successful follower, market exit)
- Exertris exercise bike (start-up, short time-to-market)
- Palm Pilot (product vision; 'crossing the chasm')
- Pioneer digital sound projector PDSP-1 (technology licensing)
- smart car (lean manufacturing, supply chain partnering)
- ASML TWINSCAN (technology network)
- Airbus A380 (consortium, 're-integration')
- Linux (open-source software)
- Zara fashion (responsiveness, vertical integration)
- Chopper bicycle (design inspired by 'lead-users')
- IBM PC (dominant design, successful follower)
- Bowmar calculators (failure to capture value from innovation)
- Sinclair C5 (technology push, failed innovation)
- Ariane 5 flight 501 (catastrophic failure, software reuse)
- EMI CAT Scanner (failure to capture long-term value from innovation)
- Dasani (product launch, branding; misfortune-'sod's law')

Detailed case histories are available at the Centre's Product Case Histories page:
<http://www.betterproductdesign.net/npi/products/index.htm>.

Source: Centre for Technology Management, 2005.

The practice of technology management and the development of technology strategy require an

understanding of the different forms of innovation and the features of each form.

- Incremental innovations exploit the potential of established designs, and often reinforce the dominance of established firms. They improve the existing functional capabilities of a technology by means of small-scale improvements in the technology's value, adding attributes such as performance, safety, quality, and cost.
- Generational or next-generation technology innovations are incremental innovations that lead to the creation of a new but not radically different system.
- Radical innovations introduce new concepts that depart significantly from past practices and help create products or processes based on a different set of engineering or scientific principles and often open up entirely new markets and potential applications. They provide new functional capabilities unavailable in previous versions of the product or service. More specifically related to business, radical innovation has been defined as "the commercialization of new products and technologies that have strong impact on the market, in terms of offering wholly new benefits, and the firm, in terms of its ability to create new businesses." (O'Connor and Ayers)
- Architectural innovations serve to extend the radical-incremental classification of innovation and introduce the notion of changes in the way in which the components of a product or system are linked together.

There are two important steps required to properly manage corporate innovation. First is to correctly identify a project as a new product vs. a technological innovation, so a proper development process can be used (the first may be a more traditional stage-gate process; the second should be more cyclical and iterative). Second, managers need to identify what category an innovation falls under, since each type of innovation has its own challenges. In the aircraft industry, for example, an improvement in the construction of a wing is an incremental innovation. Such a new technology can be introduced relatively easily and integrated with existing products. An example of a generational innovation is the introduction of the Boeing 777, a new class of aircraft different from previous models. While similar in appearance to the 767 and its predecessor, the 777 introduced a whole new set of technologies and capabilities, requiring tremendous investment by Boeing and its business partners. A radical innovation in aircraft was the introduction of the jet engine, which completely changed the performance of aircraft compared to propeller-driven air-

planes. Finally, the concept of a flying machine as envisioned by the Wright Brothers exemplifies an architectural innovation. Prior to the Wright brothers, the concept of mechanical flight had been invented and discussed. The Wright brothers actually developed and demonstrated a design that made human flight a reality.

INNOVATION MANAGEMENT

Invention is an activity often identified with a single engineer or scientist working alone in a laboratory until he or she happens upon an idea that will change the world, like the light bulb. In reality, industrial invention, at least since the time of Edison, has involved many people working together in a collaborative setting to create new technology. Innovation requires an even broader set of people, including manufacturing engineers, marketing and sales managers, investors and financial managers, and business strategists. The methods for organizing this set of people to bring a new idea from the laboratory to the marketplace form the basis of the discipline of innovation management.

Innovation traditionally has been viewed as a linear process, which involves several stages in sequence: research, development, manufacturing, marketing, and ultimately, reaching the customer.

In each step, a group of employees take the idea as it is passed to them from the previous stage, modify it to accomplish a specific function, and pass it on to the next stage. Each team involved in the process has a clear function. Researchers are responsible for creating a working demonstration of the technology, developers and engineers turn it into something that can be produced, manufacturing engineers actually turn out the product, and marketers sell it to customers.

This linear model of innovation has proven to be a misconception of the process, however. For example, problems during the manufacturing process may require researchers to go back and change the technology to facilitate production. The technology may reach the marketing stage, only to turn out to be something no one wants to buy. Technology cannot be handed off between stages like a baton in a relay race. In any case, managing innovation in a sequential process would take a very long time, especially if each stage needs to perfect the technology before it can move on to the next stage. Some models simply add on to the linear stage-gate development approach, adding R&D discovery or planning phases to the front end of the process.

An alternative to the linear model of innovation was offered by the expanded, *chain-linked* model of innovation. This model captures the interactions between the different stages of innovation in a more

complete fashion. Some of the important aspects of innovation highlighted by this model are:

- Technologies can move both forwards and backwards in the process, for example going back to the lab if further development is needed.
- Downstream stages (such as marketing) can be consulted for input at earlier stages (such as design and test).
- Scientific research and engineering knowledge contributes to every stage in the innovation process.
- Most firms create technology platforms, which are generic architectures that become the basis for a variety of technology-based products and services.
- The knowledge and skills needed for innovation are developed by communities of practitioners, not by individuals, and many of those communities exist outside of a particular firm (for example, in universities).
- Users of technology can be an important source of ideas for improvements or even new innovations with substantial market potential.

While the chain-linked model of innovation is more difficult to comprehend and analyze than the linear model, it is ultimately more rewarding as it tracks more closely to the way that innovations actually progress on their way from the laboratory to the marketplace.

Another innovation process suggested was new technology exploitation (NTE), as suggested by Bigwood, which resides somewhere between new product development and “pure science.” He defined NTE as “the testing of novel technical approaches specifically aimed at achieving a pre-defined result (target performance, cost reduction, etc).” It is an iterative process, allowing for the more cyclical learning process of scientific discovery, but clearly working toward tangible goals and benefits.

Another technology management process, Strategic Technology Roadmapping (TRM) was discussed by Rachel Wells et al in *Research Technology Management*. Technology road mapping is both a process and a communication. TRM aims to “integrate technology issues considerations with the strategic business context, to identify those technologies that have the greatest potential to meet business goals, and to accelerate the transfer of technology into products.” TRM makes use of visual aids to show links between R&D programs, capability targets, and requirements. It also seeks to help coordinate technology plans at a strategic level, and to help senior managers make

better technology investment decisions. It also helps to manage conflicts between technology “push” and market “pull,” which are discussed in more detail below.

INTERNAL FORCES AFFECTING INNOVATION

While users and other external organizations are important sources of ideas for innovations, the internal organization of a company has the greatest impact on its capability for creating innovation. The ideal work environment for innovation does not exist. Instead, innovation is facilitated through the tension and balance between various conflicting but necessary forces:

- Creativity and discipline. Creative employees are needed who challenge existing assumptions and develop new and radical approaches to solving key problems. That creativity must be tempered by the discipline to capture the ideas generated by creative employees and by systematically determining which ideas can be turned into innovations, and how.
- Individuality and teamwork. Creativity is considered an individual trait, with some people being more naturally creative than others. But innovation is clearly a team effort, often involving hundreds or thousands of people. While companies should allow employees to express their individuality as a way to facilitate creative thought, that freedom must be placed in the context of the firm as a collaborative environment, where even the most brilliant individual has to work well with others for the company to succeed.
- Exploration and focus. New ideas can come from a wide variety of sources, and it is hard to predict which paths of investigation will lead to the next breakthrough technology. Still, no firm has the resources to conduct research in every conceivable field at all times. The freedom to explore new domains of knowledge needs to be balanced by corporate decisions on what areas of investigation have the greatest promise of paying off, and focusing research in those areas.
- Long-term and short-term. Radical innovations often take years to progress from concept to tangible product. For example, the digital computer invented in the 1950s had its roots in research conducted in the mid-1800s on logic and mathematics. Unfortunately, most firms cannot spend money on research that will only begin generating revenues in

ten or twenty years. Most innovative activity in firms by necessity is focused on short-term improvements and technologies. Still, firms should not lose sight of long-term innovations, as those are the technologies that can undermine existing market dominance.

One enduring debate in technology and innovation management is whether small firms are inherently more innovative than large ones. The answer appears to be different at different times. For example, the small firm Apple Computer appeared to turn out many more innovations in the 1980s than its large rival, IBM, but in the 1990s, IBM used its huge resources to regain technological dominance in computers while Apple floundered. During the 2000s, Apple came back strongly with innovative designs and technology, such as the iPod, and made big waves in the consumer arena. Also during 2004, IBM elected to sell its personal computing division to focus on information technology and software development. IBM appeared to be shedding some weight to focus on innovation and development in core business areas.

It may be more accurate to say that small firms are better organized to handle specific types of innovation compared to large firms. Small firms have very streamlined organizational structures that have few layers of management, and managers are multi-functional; i.e. they may handle business development as well as technical work, or they may be project leaders and handle company-wide finances. This cross-disciplinary approach favors flexibility and efficiency, which in turn is more conducive to radical innovation. The small firm model of organization is quite different from large established firms in which personnel in general have more narrow tasks and bureaucratic processes tend to suppress creativity and individual initiative.

Large companies are geared for production and distribution, which are large-scale undertakings that do not accommodate rapid change. Hence, the organi-

zational structure of a large firm is quite matrix oriented engineering disciplines are assigned to projects, and a central laboratory supports research and development. Innovation is organized in a more linear fashion, and internal organization favors discipline and focus. This type of organization is better suited to incremental innovation, since it can identify problems and focus tremendous resources on solving them.

There are several ways in which small and large firms can overcome natural tendencies to gain proficiency in all types of innovation. Lockheed Martin, a large aerospace firm, was the originator of the Skunk Works, a lean, aggressive organization focused on R&D and rapid development of cutting-edge technologies. The group is kept completely isolated from the larger corporate organization, so that the engineers are unencumbered with overhead issues that are handled by other resources within the company at large. From the cultural point of view, aside from the infrastructure a large company has to handle regulatory matters as well as financial support. A small firm and a Skunk Works of a large firm can be very similar.

A small firm, in turn, can partner with a larger firm to gain access to the resources and infrastructure needed to address incremental as well as radical innovation. Carayannis et al. (1997) found that small firms tended to form technology-based strategic alliances as a source of financing. The funds gained through the alliance with a larger firm are then devoted to acquiring and developing tangible strategic assets such as proprietary technology, general working capital, and skills and know-how possessed by key managerial personnel. The large firm in the alliance receives technology-related intellectual property rights (IPRs) and marketing rights more often than equity, manufacturing rights, and so forth, in exchange for their capital infusion. An alliance with a large firm can create a powerful combination that benefits both the small company and its established partner.

Table 1
Technology vs. Market Push and Pull

The Technology Perspective

	Market Pull	Market Push
Technology Pull	<i>Market Satisfying</i>	<i>Technology Satisfying</i>
Technology Push	<i>Technology Satisfying</i>	<i>Market Seeding</i>

During the early 2000s, companies were still seeking ways to build radical innovation competencies into their own organization. O'Connor and Ayers reported on a three-year study of twelve large firms (such as GE, Corning, IBM, and Shell Chemicals, among others) who worked to develop this competency, and identified three key competencies that were critical to success:

- Discovery—creation, recognition, elaboration, and articulation of opportunities
- Incubation—experimentation, technical, as well as for market learning, market creation, and matching the innovation with company strategy
- Acceleration—exploiting the technology, investing to build new business and infrastructure, responding to market opportunities

Finally, O'Connor and Ayers concluded that no one model works for all companies. Of the twelve companies studies, four had very distinct but different approaches, each influenced by that company's corporate culture. But nearly all participants in the study acknowledged a need for cultural change within the organization before radical innovation could take place.

EXTERNAL FORCES AFFECTING INNOVATION

Various forces outside the direct control of the firm can also affect the innovation process. One set of forces relates to the tension between the demands of the market and the capabilities of the technology under development.

A conventional way of analyzing technology development is to contrast the influence of *technology push* with that of *market pull*. The primary difference between a push or pull scenario is between solving a problem and accommodating a solution. Technology

push is the process of solving a problem by providing a technical answer to a market need (which can be either anticipated or existing). Market pull involves solving a problem to provide a market answer to a technical need, or accommodating a technical solution by finding market uses. The dynamic balancing act between technology push and market pull drives the speed and acceleration of technological change, and in the process creates significant windows of market opportunity as well as competitive threats to the established technologies.

The terms push and pull can be expanded to encompass either a technology or market point of view:

- Technology push has been historically defined by an innovation-cycle-driven culture focused on marketing/technology management analysis. In this context, a firm's R&D division brings an idea from the invention stage to its fruition in commercial markets.
- The not-so-traditional technology pull is best described as the reaction to demand in the market. The desire for more efficient technologies by customers creates incremental improvements in these technologies that may eventually lead to a critical mass of innovations and possibly to radical improvements.
- On the other hand, market pull has been historically defined by marketing. The marketplace dictates the products that are to be supplied by a firm. In order to meet demand, a firm must constantly strive to increase performance and customer satisfaction.
- Market push is a term that addresses the creation of markets through marketing-driven efforts that, along with technology pull, can lead to the creation of technological standards that define and enable the emergence of new markets (see Figures 1 and 2).

Table 2
Technology vs. Market Push and Pull

The Market Perspective

	Market Pull	Market Push
Technology Pull	<i>Reacting to Demand</i>	<i>Seeding Demand</i>
Technology Push	<i>Meeting Demand</i>	<i>Anticipating Demand</i>

Source: Carayannis, Elias and Samanta Roy, "Davids vs. Goliaths in the Small Satellite Industry: The Role of Technological Innovation Dynamics in Firm Competitiveness." *International Journal of Technovation*, under review

In Figures 1 and 2, we interpret the possible configurations combining market and technology push and pull from a technology and a market perspective. The emphasis swings from a reactive stance, through an accommodating one, to a proactive one (from reacting to demand and satisfying markets to seeding and anticipating demand). The relative strength of each of the four forces (technology push or pull and market push or pull) varies during the lifecycle of the technology.

Technologies, as they develop, often follow a pattern known as the technology S-curve. In the first phase of development, tremendous investment in the technology yields relatively little improvement in performance, since the investment is devoted to researching various aspects of the technology, many of which do not have useful results. At some point, the technology takes off when a key breakthrough is made. At this critical moment, called an inflection point, the performance of the technology improves rapidly. During this second, or growth, phase, additional investment is focused on the technological breakthrough, with rapid results. As that breakthrough technology is more fully understood and exploited, the rate of improvement begins to slow and the technology enters its third phase, maturity. Finally, the technology reaches a point where additional research yields little new knowledge and few results. At this point, the technology begins the final stage, decline, and often becomes obsolete as better technologies are developed and introduced to the market.

Technology and innovation management constitute a discipline of management that continues to gain importance, impact, and attention. As technology is a pervasive force in business and in society, management of technology helps to ensure that the development of new technology and its applications are aimed at useful purposes, and that the benefits of new technology outweigh the disruptions and difficulties that accompany innovation. While it is possible to specialize in technology management, this discipline also constitutes a set of skills that all managers should possess in the modern technology-intensive and technology-driven world of business.

SEE ALSO: Innovation; Management Information Systems; New Product Development; Organizational Learning; Technology Transfer

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TECHNOLOGY TRANSFER

Technology transfer is a fast-growing activity in the U.S. research and development system, and one which has received substantial attention from governments, industry, and universities. The exact nature of this activity is difficult to pin down, partly because the term has many different connotations. Some of the varieties of technology transfer commonly discussed in business periodicals (such as the *Wall Street Journal*) include:

- International technology transfer: the transfer of technologies developed in one country to firms or other organizations in another country. In the U.S., this issue is often associated with the undesired transfer of weapons technology to “hostile” nations.
- North-South technology transfer: activities for the transfer of technologies from industrial nations (the North) to less-developed countries (the South), usually for the purpose of accelerating economic and industrial development in the poor nations of the world.
- Private technology transfer: the sale or other transfer of a technology from one company to another.
- Public-private technology transfer: the transfer of technology from universities or government laboratories to companies.

While all four types of technology transfer are of concern to businesses, this overview will deal mostly with the first two types. International technology transfer and North-South technology transfer these activities tend to be driven directly by foreign policy and national defense concerns, while the other two types are driven by a balance of corporate and policy interests.

WHAT IS TECHNOLOGY TRANSFER?

Technology is information that is put to use in order to accomplish some task. Transfer is the movement of technology via some communication channel from one individual or organization to another. Technology is the useful application of knowledge and expertise into an operation.

Technology transfer usually involves some source of technology, group which possesses specialized technical skills, which transfers the technology to a target group of receptors who do not possess those specialized technical skills, and who therefore cannot create the tool themselves (Carayannis et al., 1997). In the United States especially, the technology transfer

experience has pointed to multiple transfer strategies, two of which are the most significant: the licensing of intellectual property rights and extending property rights and technical expertise to developing firms.

The major categories of technology transfer and commercialization involve the transfer of:

- a. technology codified and embodied in tangible artifacts
- b. processes for implementing technology
- c. knowledge and skills that provide the basis for technology and process development.

WHY TRANSFER TECHNOLOGY?

Most technology transfer takes place because the organization in which a technology is developed is different from the organization that brings the technology to market. The process of introducing a technology into the marketplace is called technology commercialization. In many cases, technology commercialization is carried out by a single firm. The firm’s employees invent the technology, develop it into a commercial product or process, and sell it to customers. In a growing number of cases, however, the organization that creates a technology does not bring it to the market. There are several potential reasons for this:

- If the inventing organization is a private company, it may not have the resources needed to bring the technology to market, such as a distribution network, sales organization, or simply the money and equipment for manufacturing the product (these resources are called complementary assets). Even if the company has those resources, the technology may not be viewed as a strategic product for that firm, especially if the technology was created as a byproduct of a research project with a different objective.
- If the inventing organization is a government laboratory, that laboratory is forbidden in general by law or policy (in the United States) from competing with the private sector by selling products or processes. Therefore, the technology can only be brought to market by a private firm.
- If the inventing organization is a university, the university usually does not have the resources or expertise to produce and market the products from that technology. Also, if the technology was developed with funding from the federal government, U.S. law strongly encourages the university to transfer the technology to a private firm for commercialization.

From a public policy perspective, technology transfer is important because technology can be utilized as a resource for shared prosperity at home and abroad. As a resource, technology (1) consists of a body of knowledge and know-how, (2) acts as a stimulant for healthy competitive international trade, (3) is linked with other nations' commercial needs, and (4) needs an effective plan for management and entrepreneurship from lab to market.

From a business perspective, companies engage in technology transfer for a number of reasons:

- Companies look to transfer technologies from other organizations because it may be cheaper, faster, and easier to develop products or processes based on a technology someone else has invented rather than to start from scratch. Transferring technology may also be necessary to avoid a patent infringement lawsuit, to make that technology available as an option for future technology development, or to acquire a technology that is necessary for successfully commercializing a technology the company already possesses.
- Companies look to transfer technologies to other organizations as a potential source of revenue, to create a new industry standard, or to partner with a firm that has the resources or complementary assets needed to commercialize the technology.

For government laboratories and universities, the motivations for technology transfer are somewhat different:

- Governments or universities may transfer technology from outside organizations if it is needed to accomplish a specific goal or mission (for example, universities may transfer in educational technologies), or if that technology would add value to a technology the government or university is hoping to transfer out to a company.
- Government laboratories and universities commonly transfer technologies to other organizations for economic development reasons (to create jobs and revenues for local firms), as an alternate source of funding, or to establish a relationship with a company that could have benefits in the future.

HOW DO YOU TRANSFER TECHNOLOGY?

The first requirement for an organization to transfer a technology is to establish legal ownership of that technology through intellectual property law. There

are four generally recognized forms of intellectual property in industrialized nations:

- patents, dealing with functional and design inventions
- trademarks, dealing with commercial origin and identity
- copyrights, dealing with literary and artistic expressions
- trade secrets, which protect the proprietary capabilities of the firm

Under U.S. law, a patent is granted only by the federal government and lets the patentee exclude others from making, using, selling or offering an invention for a fixed term, currently 20 years from the date the patent application is filed. The number of patents granted by the U.S. government is up by 21 percent in 2003. A trademark, as defined under the Trademark Act of 1946 (The Lanham Act) is "any word, name, symbol, or device, or any combination thereof (1) used by a person, or (2) which a person has a bona fide intention to use in commerce. . .to identify and distinguish his or her goods, including a unique product, from those manufactured or sold by others, and to indicate the source of the goods, even if that source is unknown."

A copyright seeks to promote literary and artistic creativity by protecting, for a limited time, what the U.S. Constitution broadly calls writings of authors. The general rule in the United States for a work created on or after January 1, 1978, whether or not it is published, is that copyright lasts for the author's lifetime plus 50 years after the author's death. The copyright in a work made for hire or in an anonymous work lasts for 75 years from publication or 100 years from creation, whichever is shorter.

A trade secret is information that an inventor chooses not to disclose and to which the inventor also controls access, thus providing enduring protection. Trade secrets remain in force only if the holder takes reasonable precautions to prevent them from being revealed to people outside the firm, except through a legal mechanism such as a license. Trade secrets are governed by state rather than federal law.

The second step in technology transfer is finding a suitable recipient for that technology—one that can use the technology and has something of value to offer in return. Firms are now studying more systematically the process of licensing and technology transfer. There are five information activities needed to support technology transfer:

- technology scouting—searching for specific technologies to buy or license.
- technology marketing—searching for buyers for a technology, the inverse of tech scouting;

also searching for collaborators, joint venture or development partners, or for investors or venture capital to fund a specific technology.

- technology assessment—evaluating technology, aimed at answering the question “what is this technology worth?” Includes research of any intellectual properties, and market and competitor assessments.
- transfer-related activities—information about the transfer process itself, such as licensing terms and practices, contracts, conducting negotiations, and how to do the transfer most successfully.
- finding experts—to assist in any of the above areas. A common saying in the field is, “technology transfer is a contact sport.”

These information needs are often supported by service companies, such as licensing consultants, and by electronic media, including databases and online networks. Some new online networks use the Internet to help firms in these information activities.

The information-transfer process is one of the most critical steps in technology transfer. New licensing practices are designed to address this process. For example, many licenses now bundle both the basic technology and the equipment needed to utilize that technology in a single agreement. A license may also include a “know-how” agreement, which exchanges relevant trade secrets (with appropriate protections) to the licensee to help in exploiting technology. In some industries, such as petroleum exploration, firms even practice wet licensing, whereby employees of the licensor are loaned out to the licensee to teach how a technology should be properly used.

The major barrier to the increase in technology transfer among firms is organizational behavior. In the past, cultural blocks such as the “not invented here” syndrome prevented firms from even showing interest in technology transfer. New concepts along the lines of knowledge management are changing behaviors and beliefs, leading firms to realize the enormous gains to be made through the active pursuit of licensing.

Once the organization has at least started to establish ownership of the technology, there are several possible legal and/or contractual mechanisms for transferring technology from one organization to another:

- licensing—the exchange of access to a technology and perhaps associated skills from one company for a regular stream of cash flows from another.
- cross-licensing—an agreement between two firms to allow each other use of or access to specific technologies owned by the firms.

- strategic supplier agreement—a long-term supply contract, including guarantees of future purchases and greater integration of activity than a casual market relationship. One prominent example is the second-source agreements signed between semiconductor chip manufacturers.

- contract R&D—an agreement under which one company or organization, which generally specializes in research, conducts research in a specific area on behalf of a sponsoring firm.

- joint or cooperative R&D agreement—an agreement under which two or more companies agree to cooperate in a specific area of R&D or a specific project, coordinating research tasks across the partner firms and with sharing of research results.

- R&D corporation or research joint venture—the establishment of a separate organization, jointly owned by two or more companies, which conducts research on behalf of its owners. A notable example is Bellcore, which originally was established by the seven Regional Bell Holding Companies of the United States and which would conduct research and set standards for the local telephone system.

- research consortium—any organization with multiple members formed to conduct joint research in a broad area, often in its own facilities and using personnel on loan from member firms and/or direct hires. The Microelectronics and Computer Technology Corporation (MCC) and Semiconductor Manufacturing Technology (SEMATECH) are examples of such organizations.

The choice of which mechanism to use in a particular technology transaction depends on many factors, including the stage of development for that technology, what the company receiving the technology is willing or able to pay, what technology or other assets it might be able to offer in place of money, the likely benefits of establishing a longer-lasting partnership between the organizations instead of a one-time transfer; and the exact legal status of ownership over that technology. For example, if a small firm simply wants to sell its technology to a large firm in exchange for money, it will probably choose to license the technology. If the small firm also wants access to the large firm’s complementary assets, such as its production facilities and distribution network, it will try to negotiate a more substantial and permanent relationship, such as an R&D contract or a cooperative R&D agreement.

PRIVATE TECHNOLOGY TRANSFER

Technology transfer between private companies is most commonly accomplished through licensing, although other mechanisms such as joint ventures, research consortia, and research partnerships are also quite popular. Licensing is a big business by itself. In 2002 U.S. companies received over \$66 billion in payments on technology licenses from other organizations, of which \$58 billion was from domestic sources. Data from the U.S. Department of Commerce compiled in the mid-1990s indicated that international technology licensing was rising at approximately 18 percent per year, and domestic technology licensing was rising at 10 percent per year.

Another growing mode of private technology transfer is the formation of research joint ventures (RJVs) between companies in the United States. For years, such joint ventures were rare, mostly due to fears among companies that joint ventures would provoke antitrust litigation from the government. Passage of the National Cooperative Research Act (NCRA) in 1984 and the National Cooperative Research and Production Act in 1993 relaxed antitrust regulation of such partnerships, leading to a substantial increase in RJVs.

Studies of the filings of RJVs registered with the Department of Justice under the NCRA shows some interesting trends:

- Although multi-firm consortia such as SEMATECH and the Microelectronics and Computer Corporation (MCC) attract the most interest, about 85 percent of RJVs involve only two firms.
- Most RJVs focus on developing process technologies rather than product technologies, as processes are viewed as pre-competitive technologies in many industries.
- The largest concentration of RJVs focus on telecommunications, while software and computer hardware are also leading industries for RJV activity. These industries have significant impact on technological advances in other industries, and therefore attract much interest for partnering firms. Not surprisingly, RJVs are less common in the chemical and pharmaceutical industries, probably because process technologies have greater competitive impact in those industries than in others.

Research joint ventures are an advantageous means of acquiring high-risk technologies, for several reasons. First, joint ventures enable the risks and costs involved in early research in technology to be shared across multiple firms, reducing the burden on each individual company. Second, the resources and expertise

needed to develop certain technologies may be distributed across multiple firms, so RJVs are the only way to combine those resources in one effort. Third, in industries where technology advances quickly, RJVs are an effective way to keep up with new developments. Finally, RJVs are often used to develop and set critical technical standards in certain industries, especially telecommunications. These reasons indicate that RJVs will continue to increase in significance as a tool for technology transfer.

TECHNOLOGY TRANSFER FROM GOVERNMENT TO INDUSTRY

In an effort to increase the application of government research results to industry technology problems (and therefore fuel technology-based economic growth), the United States government has passed a series of laws since 1980 to encourage the transfer of technologies from government laboratories to industry. Technology licensing was the earliest focus of activity, based on the notion that government laboratories were like treasure chests of available technologies that could easily be applied to corporate needs. In fact, government technology licensing activity is extremely limited, except in the National Institutes of Health. The NIH has been the source of several groundbreaking therapies and other medical technologies and enjoys close relations with the pharmaceutical industry, enabling the agency to gain large amounts of licensing revenue.

Other agencies face substantial difficulties in licensing technologies. Often, their technologies require substantial development before commercialization, reducing their value to firms. Also, most government laboratories do research in areas where there is no clear, consistent path to commercialization as exists in the pharmaceutical industry. The uncertainty of commercialization also diminishes the willingness of firms to purchase technology licenses from laboratories.

Instead, most agencies have focused on signing Cooperative Research and Development Agreements (CRADAs), a mechanism developed under the 1986 Federal Technology Transfer Act. CRADAs are contracts to conduct joint R&D projects, where the government laboratory contributes personnel and equipment, while the partner contributes these assets and funding as well. The number of CRADAs signed by government agencies has increase steadily in recent years.

There are several potential benefits and potential difficulties involved in CRADA research relationships:

- Transfer of product and process technologies can have a significant impact on recipient

firms' business performance. For example, the invention of an improved method for delivering the medication paclitaxel was licensed by the National Institutes of Health to Bristol-Myers-Squibb as the product Taxol, which has since become a leading treatment for breast and ovarian cancer. However, there is no data to show what portion of transfers are successful versus those which are not.

- Technology transfer may or may not result in commercial products. A survey of 229 technology transfer projects at 29 federal laboratories, conducted by the Georgia Institute of Technology, found that 22 percent of the projects resulted in new commercial products, while 38 percent contributed to products under development. Interestingly, in 13 percent of the projects, new product development or product improvement was never a goal.
- Laboratories' views on technology transfer can affect success. Now that most of the legal barriers to technology transfer have apparently been eliminated by congressional legislation, the true barriers are generated by the culture of the laboratories and the attitudes of researchers and laboratory administrators. For example, in several cases firms have complained that laboratory researchers were not used to meeting the strict timetables on project completion that private sector researchers must observe.
- Technology transfer, especially in joint research, can aid the government laboratory as well. A report by the GAO examining ten CRADA projects found that the laboratories can also benefit from technology transfer, for example, through enhanced expertise for researchers, development of technologies that also support the laboratory's mission, acquisition of sophisticated equipment and infrastructure, and increased laboratory revenues from industrial sources.

UNIVERSITY-INDUSTRY TECHNOLOGY TRANSFER

One of the original pieces of U.S. technology-transfer legislation, the Bayh-Dole Act, directed government agencies to encourage universities and other research organizations to license out technologies developed with federal funding. Since 1980, this activity has become a small but growing source of revenue for universities. Technology transfer from academia and other research institutions to industry continues to

grow, according to the annual survey of the Association of University Technology Managers. The 2003 survey shows that increasing numbers of research institutions are forging licensing agreements with commercial entities to bring newly developed technology and products to the market. In 2003, the 165 institutions of higher education responding to the survey reported receiving close to \$1 billion in licensing revenue in 2003, a 1 percent increase over 2002.

Commercial institutions pay royalties for the right to put inventions and discoveries from universities to commercial use in products such as computer-imaging technology, medical diagnostic testing, and treatment of disease. Institutions of higher education, in turn, can use the revenue to increase investments in research and development. This technology transfer also leads to sponsored research agreements between firms and universities, often to undertake additional research needed to commercialize technologies. Universities now receive approximately 7 percent of all research funding from industry, compared to about 3 percent in the 1970s. Institutions of higher education also reported spinning off nearly 350 companies and receiving 3,450 U.S. patents for new technologies and inventions. Since fiscal year 1998 when the question was first asked, 178 U.S. survey respondents have reported a total of 2,230 new products introduced to the market place.

For industry, universities offer the best way to acquire basic technological research as those activities are curtailed within firms. Universities also house experts in very focused fields of study that are likely to have benefits to a small number of firms. Finally, joint industry-university research is viewed as an important recruiting tool in today's competition for scientific talent, since industry-funded projects are often carried out by graduate students who later go to work for their former sponsors.

Technology transfer is a valuable mechanism by which industry can accelerate its innovation activities and gain competitive advantage through cooperation. Technology transfer can also boost overall economic growth and regional economic development. While further study is needed to estimate the exact benefits gained from technology transfer and ways to achieve those benefits, it is clear that this is an activity that is becoming a central feature of the U.S. research and development system.

SEE ALSO: Joint Ventures and Strategic Alliances; Licensing and Licensing Agreements; Technology Management

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a summary of the major classes of telecommunications services and how they function.

Table 1
Telecommunications Providers and Data Networks

Local and Regional Telephone

- **Regional or local phone services—from central office to residents**
- **Wireless phone services—from local towers to adjacent cell phones**
- **Commercial phone services—from central office to businesses**

Long-Distance Telephone

- **Phone/voice networks—backbone of the long-distance phone system**

Internet and Data Networks

- **Data/voice over the Internet backbone or private networks**
- **Internet content areas: Web sites, subscription content, private networks linked to Internet**

Television

- **Regional cable-TV companies—central office downloads TV programming and sends it out to residents**
- **Satellite TV companies—residents each have satellite dish**
- **Broadcast networks—content is beamed up to satellites, received by local stations, and retransmitted as conventional analog or digital signals to viewers**

TELECOMMUNICATIONS

Traditionally, telecommunications denoted the long-distance connections that linked television networks to their affiliates and the long-distance phone connections that linked telephone networks to local switching centers. Hence the term applied both to AT&T’s long-distance telephone network and to the television industry’s worldwide networks—but each used very different technologies to transmit voice or video. Now with the rapidly growing size of the Internet, telecommunications has expanded to include data networks. The newest technologies to join the telecommunications industry are wireless phones and wireless data businesses.

Telecommunications and information-related industries continue to enjoy a rapid growth in the Internet and the wireless phone sectors. Table 1 provides

THE REGULATORY ENVIRONMENT

The concept of universal service has traditionally referred to the goal that all Americans should have access to affordable telephone service. Television access does not require that homes be wired, so that is less problematic; but there is increasing pressure for universal Internet access. Universal telephone access has been met by means of policies established by government regulatory bodies. Phone or Internet services in densely populated areas promise good revenue and profits, because the cost of wiring businesses and residences is lessened by the short distances. The regulations are needed to ensure that people in remote areas have access; as people continue to move further and further away from population centers, the cost of bringing phone wires can be prohibitively expensive. But the phone companies are nonetheless required to extend the wire to them. The quid pro quo for making the huge investment to wire homes and businesses was protection from competitors; this protection was usually provided by state public utility commissions or municipal government policies. As a practical matter, limiting competition and the number of wires strung along highways and into homes makes good sense, especially from an aesthetic perspective.

In 1996 the Federal Communication Commission (FCC) issued an extensive new set of regulations to increase the competition in the industry. The local phone companies take serious objection to competitors coming into their territories and grabbing business and residential customers in the densely populated urban and suburban locations. But that is what is happening; cable-TV companies are partnering with long-distance companies and using their cables to offer a package of phone, TV, premium TV, digital music, Internet access, and e-mail. The Regional Bell Operating companies have also engaged in a variety of mergers. The FCC appears to be ready to approve mergers that open up competition in the local phone and cable-TV markets (e.g., AT&T was allowed to acquire TCI and other cable services), but not always the mergers between local phone companies.

The National Telecommunications and Information Administration (NTIA), an agency of the United States Department of Commerce, is the executive branch's principal voice on domestic and international telecommunications and information technology issues. NTIA works to spur innovation, encourage competition, help create jobs, and provide consumers with more choices and better quality telecommunications products and services at lower prices. Now that a considerable portion of today's business, communication, and research takes place on the Internet, access to the computers and networks may be as important as access to traditional telephone services. The NTIA is preparing policy to ensure access to the Internet service.

THE FCC AND COMPETITION IN THE TELEPHONE INDUSTRY

In 1982 AT&T signed a consent decree agreeing to the break up of its business into the long-distance business, which it retained, and seven Regional Bell Operating Companies (RBOCs), which became separate business entities serving specified regions. The Telecommunications Act of 1996 was a major revision of policy regulating the industry. That act attempted "to promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage rapid deployment of new telecommunications technologies." The act tried to stimulate competition by laying down the conditions for regional phone companies to move into the long-distance arena and for long-distance carriers to offer business and residential phone services. But little in the way of increased competition has occurred in the mainstream telephone industry, even less in the cable-TV industry.

In 1999 competition was heating up as businesses in all three sectors went after three major opportunities for growth and increased profits: (1) the rapidly growing market for Internet access, (2) the rapidly

growing market for wireless phones, (3) the opportunity to grab a share in all sectors by offering customers a package rate on phone, wireless phone, cable-TV, and Internet services. The current situation in these markets is:

1. The long-distance market is rapidly expanding to serve both the increased number of long-distance phone calls and, especially, the greatly increased demand for Internet access. At the same time competition is increasing, and the amount of capacity is multiplying because of advances in fiber-optic technology. As a result, prices are declining and profits are squeezed because of the huge costs of upgrading the technology of the vast infrastructure
2. Cable-TV companies are in the best position to become profitable, because their cable systems can provide the full package of services into the home. Providing long-distance phone service and Internet service requires a partnership with a long-distance carrier. As a result, mergers in the business have become hot topics. The cable-TV sector is the least competitive telecommunication market, and cable companies have been able to increase their rates. But many companies carry a large debt load resulting from the costs of upgrading their cable systems; repayment of their debt is the justification for rate increases.
3. The regional phone carriers are poorly situated for long-term competition. Currently, most are protecting their profit margins and fending off competition. But direct competition from the cable-TV and AT&T companies in the local phone business could be catastrophic for them; AT&T is promising substantially lower monthly phone rates. The phone companies are impeded by their slow-speed wires and switches from providing high-speed Internet access-video over their system is impossible. They are being forced to consider the huge investment required by rewiring every home in order to stay competitive.
4. The wireless phone business is largely unregulated, highly competitive, and growing very rapidly. Having a national network, whereby long distance calls remain on a single carrier's infrastructure, has become a strong competitive edge. The result is that customers' phones work in every major city and that there are no roaming charges to cover long-distance changes from other inter-exchange carriers. Bigger is better in this environment, and large wireless companies are thus merging with long-distance carriers.

5. Internet access and e-mail are the fastest growing services in the telecommunications industry. The Internet-service business is made up of the linkages from homes and businesses to Internet service providers (ISPs), which in turn provide linkages to the major Internet backbone mostly provided by long-distance carrier MCI Worldcom. In 1999 most of the linkages from homes and businesses were carried by the local phone companies; while much faster speeds were available from the cable-TV firms, few were ready to provide data services. Competition for high-speed linkages from home or business to the Internet backbone will be intense. The cable-TV industry is much better positioned to capture business in the short term; eventually, digital lines into businesses and homes will probably be needed as voice, TV, data, and on-demand video are all delivered in a digital format as part of a package of services.

THE TELEPHONE INDUSTRY

A long-distance telephone call is the typical way in which most people experience the telephone network, which extends from home phones to a local switching center, then to another remote switching center, and finally to the home or business called. The term telecommunications primarily applies to the long-distance carriers, such as AT&T, MCI, and Sprint, which carry transmissions between switching centers. The local telephone markets are dominated by the Regional Bell Operating Companies (RBOCs), such as Verizon, BellSouth, and SBC Communications. The RBOCs bear the responsibility for universal access, for ensuring that every residence—no matter how remote—has affordable phone service. Often these rural and remote sites pay the minimum amount, approximately \$15 per month, for the minimal service. The RBOCs claim that their costs for customers exceed \$15 per month; the public utility commissions at the state level help the RBOCs subsidize those customers with revenue from urban and suburban customers, as well as access fees paid by long-distance carriers. The RBOCs are guaranteed a profit by the public utility commissions, but the rates have been virtually constant with little growth in the number of phones added. At present, this is a good business to be in, but it is expected to be a very bad business as competition from cable-TV companies drives down prices.

Each local telephone center is a hub from which copper wires extend to homes and businesses. This last mile of wiring is the window or portal into millions of homes and businesses, controlling—in some ways—the services provided and the revenues generated

from homes and businesses. The last mile of wiring is also the major bottleneck to providing better and faster services to those millions of sites. The twisted pair wires in virtually every home are the major problem with boosting the speed of Internet access over those lines. But those millions of miles of wires are extremely expensive to replace. In order for the regional phone companies to effectively compete against the cable-TV companies, they will have to re-wire, thereby opening up the possibility of providing the full bundle of services to the home owners.

In every major Asian city, wireless phones are everywhere. This phenomenon will be repeated in the United States as more and more workers transact business away from their desks, and as less and less time is spent at home. It is quite possible that phone calls originating from wireless phones will surpass those from wired phones in the near future.

John Malone, a cable industry executive, coined the term convergence to describe the packaging of multiple services to customers, such as cable-TV, premium movie channels, Internet services, digital music channels, and phone service. Convergence is made possible by advances in transmission technology; all of those services can be provided to homes over a single cable. And that means that cable-TV companies can move into the phone business, phone companies can move into the TV business, etc. As convergence becomes a reality, competition in the telecommunications industry moves to new level.

TELECOMMUNICATIONS TECHNOLOGIES

All the major cable-TV companies have announced that they will provide high-speed Internet services alongside the regular TV and pay-per-view channels; TCI and Time Warner say they will also include telephone services. All these services will be offered over one coaxial cable (wire). The cable companies employ a transmission approach called broadband; Media One's logo includes the phrase "Broadband is the Future." Coaxial cable can carry high-speed data and/or multiple channels of video over an insulated central copper wire wrapped in another cylindrical conducting wire, which is then shielded and wrapped in a protective cover. This wire is split into many channels by breaking out the wiring spectrum into multiple frequencies and transmitting each channel on a separate frequency; this is what broadband means, it delivers an amazing amount of content by using frequency division multiplexing. Part of the available frequency spectrum is dedicated to data for Internet access and another part is dedicated to voice for telephony.

As great as broadband sounds, it has the inherent drawback of being an analog approach for sending digital TV signals, digital sound, and for sending and

receiving digital data; at both ends of the cable, a digital-to-analog or analog-to-digital conversion is required. Another potential problem is that the data channel might become overloaded as more and more customers begin to interact with Internet services; broadband was designed as a transmission approach to send multiple channels of video one way only, while e-mail service is two way.

The unshielded, twisted pair of wires in virtually every home are the major impediment to boosting the speed of Internet access over phone lines. Speed for sending and receiving data is expressed in terms of how many bits (ones or zeros) per second can be moved. The maximum speed for a telephone modem is 56,000 bits per second; most people find that annoyingly slow. The phone companies are implementing a new service called digital subscriber line (DSL), which uses its four wires to carry both voice and data simultaneously in both directions. Data can be received or downloaded from the Internet at speeds up to 1.5 million bits per second, but data sent from the home moves at a much slower rate. DSL technology, however, is proving difficult and expensive to implement, especially at distances greater than two miles from the switching centers. The requisite DSL modems are also more expensive and difficult for users to install. DSL gives the phone companies voice and high-speed data services, it does not open up the lucrative premium TV market. In order for the regional phone companies to effectively compete against the cable-TV companies, they will have to re-wire, either with coaxial cables or fiber-optic cables. But that will make them competitive with the cable companies and open up the possibility of providing the full bundle of services to home owners.

Fiber-optic wiring is the preferred choice of the long distance companies and often the preferred choice of regional telephone companies as they upgrade in urban and suburban locations where demand for capacity is a concern. Fiber-optic media is much faster than electrical wires, it is unaffected by electrical interference, and much more secure. But it is much more expensive to install because these tiny glass filaments are very difficult to align and join together. Lasers transmit pulses of light, rather than electrical signals, to send data and photo-decoders to receive the data; hence the speed of the lasers is dependent on these devices. The hair-thin strands of fiber are made of very pure flexible glass or plastic filaments along which photons, the fundamental unit of light, move in waves or streams.

The speed and capacity of fiber-optic cables keeps on doubling and will continue to expand exponentially. In 1995 scientists introduced wavelength division multiplexing (WDM), a method of splitting (multiplexing) the cable into streams of color, each carrying 2.5 billion laser pulses per second. Initially

each fiber carried eight streams of data at 2.5 gigabit speeds, the multiplexed total capacity being twenty gigabits per second. In 1997 new WDM devices doubled throughput with 16 color bands, and soon after it became possible to multiplex into 40 colors; in 1998 80-band systems were announced as were 160-band systems for the year 2000. At the same time, the lasers sending and receiving the data streams increased in speed from 2.5 gigabits to 10 gigabits. 400 gigabits-per-second speeds per fiber strand are commercially available, as well as, terabit speeds provide quite a contrast to the 56,000 bits per second modem speed.

So much additional capacity has become available that prices dropped by a substantial amount. Inexpensive high-speed communication links mean that distance is dead; instantaneous global transactions can become a reality.

WIRELESS PHONES

There is rapid growth (approximately 80 percent per year) in the wireless phone business. Prices continue to decline for both the phone devices and the monthly service charges. Sprint, AT&T, and Verizon (to name a few companies) are advertising hundreds of minutes of calls anytime and to anywhere in the United States for \$49 per month; this is an example of a price incentive made possible because of these companies national networks. It would not be surprising to see mergers between other long-distance companies, following the lead of MCI WorldCom.

Wireless phones and wireless data services send and receive voice and data from their antennae to local towers, which are, in turn, linked to adjacent towers and long-distance lines. The area within range of any tower is called a cell; most are adjacent to other cells, forming a honeycomb pattern. As mobile wireless phones move from cell to cell, their calls are automatically switched from tower to tower. There are many dead spots-especially in rural areas-with no reception because there are no towers nearby.

The first cell phones were analog devices, with well-known security problems and often poor-quality reception. Cellular phones broadcast in the 800-900 MHz frequencies; which some scanners can hear. The newer digital phones provide better security and better quality sound, but they operate at lower voltages, have shorter ranges, and require more towers. The PCS standard for digital phones has been widely accepted in the United States, but Europeans have adopted another digital standard, GSM, making wireless communications during international travel difficult.

There is already a great deal of push to commercially provide wearable PCs, combinations of PDAs (personal digital assistants) and phones that handle both voice and data. A small single device would offer

voice mail and e-mail, pager and beeper services, Internet access, word processing, spreadsheets, and graphics. Digital phones can handle digital data. The next generation, of wireless services, is available now; these Internet devices will feature 400,000 bps speeds, with more to come.

CONVERGENCE ON DIGITAL TRANSMISSION

Many of the long-distance companies have adopted and are implementing a data networking approach, now being called an IP standard from the UNIX TCP/IP protocol suite. Data, voice, and video are being sent digitally as packets of data, rather than as parts of an analog frequency. The digital approach promises faster, cheaper and better telecommunications services; it is especially well suited to the fiber-optic wiring. But it is the widespread acceptance of digital players, e.g., digital TV, digital phones, CD and DVD video and music players, not to mention PCs, which suggests that digital data networks make the most sense. And in the long-distance arena, with the amount of data surpassing the amount of voice, moving both voice and data to IP networking, as AT&T is, reduces complexity and duplication.

Cable-TV transmissions employ frequency division multiplexing to continuously send many channels one way to the TV tuners. Data and voice transmissions are two way, often short bursts from sender and receiver. This adds considerable complexity, as TCI and Time Warner discovered during the Implementation of phone and Internet services over their coaxial cables.

Phone conversations are semi-permanent sessions between sender and receiver. The phone companies use circuit-switching technology to connect the two parties by establishing a circuit, or connection, for the duration of the call for the exclusive use of the two parties. But that is preceded by establishing the linkage or circuit through the local switching center, the long-distance carrier, and the other switching center. Here again the wire capacity is broken up into circuits using frequency division multiplexing. The traditional T-1 line provides twenty-four separate telephone circuits over copper wire; each circuit is equivalent to 64,000 bits per second digital channel.

Data network standards were established as millions of local area networks were created in businesses all over the world. Data is sent and received in packets, called datagrams, defined by protocols, such as the dominant IP protocol. The packets have a "to" address, a "from" address, lots of digital data, and error-checking data; each packet also indicates that it is one of many in a group, to be assembled by the receiving computer. Data networks operate like the mail delivery system; data is put into the envelop, the to and from

addresses contain both a single individual address as well as the area's zip code. Trucks (wires) take all the mail to central hubs, where it is again sorted and sent to further destinations and, eventually to the right zip code post office, which delivers the envelop to the right home address. Data networks use packet switching devices, typically routers, to truck the packets from router to router along the path.

Packet switching is much more efficient for little e-mail messages or slow phone conversations. With packet switching, an exclusive circuit need not be maintained—the entire bandwidth is always open to accept packets. The standard for fiber optic transmission is 2.5 Gbps (2.5 billion bits per second), so very large documents or books can be moved in the blink of an eye. Compressed video and compressed music take up lots of bandwidth; a CD holds 600 million bytes (4.8 billion bits), but that can be compressed by half into roughly 2.5 billion bits, and could be send and received in a second.

TURMOIL IN THE TELECOMMUNICATIONS INDUSTRY

The telecommunications industry is in turmoil because

1. data has surpassed voice as the predominant content to be transmitted,
2. the convergence of the telephone, cable TV, and data communications industries,
3. the rapidly increasing addition of transmission capacity and rapidly decreasing prices.

Traditionally, the industry was dominated by AT&T, which built a highly reliable infrastructure to carry phone messages. Much of the telecom infrastructure throughout the world is optimized for voice, and is poorly situated for carrying data. At the current time, data make up 98 percent of the telecommunication content. Every major organization has built its own data networks, and the quantity of traffic continues to grow. These internal data networks are fast and inexpensive because they are digital. By contrast, internal data networks routinely transmit and receive data at ten million bits of data per second; phone modems, which permit data to be carried over the phone lines, are limited to 56,000 bits per second. Businesses can lease high-speed (1 million bits per second) data lines from telecommunication providers, but these lines are expensive.

The fiber-optic technology described above promises huge advances in capacity resulting in potential decreases in transmission prices. The contrast between the speeds of the fiber cables compared to speeds experienced by most residential customers and many businesses using modems in untenable. Fiber-optic cables

operate at billions of bits per second, and soon at trillions of bits per second. Local-area networks (LANs) linking PCs together operate at 10-100 million bits per second and higher, at very low costs. The slow speed of modems using phone wires is especially a problem as users attempt to download software or music, or even to access graphic-intensive Web sites.

Remaining profitable as prices drop is a difficult process. The PC industry is the clearest precedent; major computer companies, e.g., IBM, NCR, and Digital Equipment, Hewlett-Packard, were often at a disadvantage against newer companies such as Dell and Gateway. Similarly, it will be difficult for large telecommunications companies, such as AT&T, to compete against newer competitors such as Quest and ITCX. The larger long-distance carriers have worldwide operations and the economic benefits of huge scope and scale; they need not depend upon any other company's services. But these large long-distance companies have enormous investments in a now-unprofitable, but rapidly obsoleting, infrastructure. AT&T, for example, is battered by operating cost and price structures that reflect the past limitations of transmission capacity, which, in turn, resulted from slow-speed media and switching devices. It is much cheaper to maintain a single strand of fiber-optic cable and its switches than thousands of copper cables and their switches, when both carry the same amount of digital data/voice/video. The large traditional companies will be squeezed by the need to make major new investments in the latest fiber-optic switching technologies, while at the same time covering the costs of operating the old infrastructure as the prices are dropping.

Another problem for the established long-distance carriers is their requirement to pay access fees to the Regional Bell operating companies that complete their calls to customers. The rationale for the access fees is that the long-distance carriers need to contribute to the costs of providing universal service across the country, especially to the rural telephone companies, rather than have those costs shouldered only by local phone companies. The long-distance companies are saddled with \$25 billion of subsidies to the local phone services. As AT&T broke up in 1984, the long-distance business was highly profitable; long-distance calls were billed at 50 cents per minute in 1984, with access fees at 15 cents per minute; now the average long distance charge is below 10 cents per minute, but the access fees remain high—above three cents per minute.

Despite growing pressures from businesses and residential customers, access to the Internet continues to be largely funneled through telephone modems, devices which translate digital computer data into analog signals that are then carried over phone lines.

The local telephone companies appear highly resistant to upgrading their technologies and wiring. They are trying to introduce high-speed 1.5 million bits per second (inbound only) Internet access using new modem technologies, but appear to be having problems rolling out these Internet services to residential customers. Cable-TV companies provide Internet access via cable modems in the major metropolitan areas. The phone companies offer high-speed Internet access via DSL modems, but only a very limited number of homes have been wired with DSL. The cable-TV providers and the local telephone services continue to be protected by the FCC from the competitive pressures assailing the long-distance companies; they have been protected from the need to deploy digital technology in order to remain competitive.

By contrast, newer wireless cellular phone companies require a relatively small investment for a regional phone system, serving a city and suburbs, for example. But many wireless phone customers abhor the roaming charges, which are costly because the regional wireless company has to subcontract with a long-distance carrier for calls outside its region.

The telecommunications industry is experiencing a whirlwind of activity. Rapid growth is occurring in every sector of the industry, but data networks to accommodate Internet traffic are growing as fast as companies can implement them. The industry competes globally, and having global reach appears to be a competitive edge. Bigger is indeed better if the goal is to connect businesses in the United States to their subsidiaries in other regions of the globe. At the same time, the ability to deploy technology that is smaller, faster, and cheaper gives advantage to smaller, more agile companies. Smaller is better if, and only if, government regulations permit smaller companies to take chunks of the more lucrative business segments from the established companies.

In the short term, the best telecommunications segment is the cable television business. Protected by municipal regulations, the cable companies have been able to raise prices for the traditional TV fare. But it turns out that broadband cable technology is the best way to provide a wide variety of services into millions of homes: TV, pay-per-view video, Internet access, e-mail, telephone, and digital tunes. The major cable companies could be sending millions of home bills for over \$100 per month for such packages.

In the short term, the regional phone companies are in the worst strategic position. The barrier to entry to compete against the cable companies is the steep cost of rewiring millions of homes and businesses and replacing their circuit switching systems. The traditional technology is obsolete and neither ISDN nor

DSL can make telephone companies competitive against cable companies.

In the short term the wireless phone business will continue to grow and prosper. It is safe to predict continuing growth for the foreseeable future. The speculation that virtually every adult in the United States will own a wireless phone surprises very few people; virtually every adult in Singapore and Hong Kong already does. Here again, having a global or national network is a powerful competitive advantage to a wireless phone company; Sprint and AT&T are both trying to grab market share by advertising low prices for calls anywhere in the United States. Calls are handled by one carrier from end to end, resulting in less complexity, less cost, and better service. New digital phones already offer caller ID and voice mail; and by adding computing power these devices are also offering e-mail and access to business databases via the Internet. Sending and receiving wireless data is relatively easy in a digital environment.

“Distance is dead,” claims Tom Peters in his book *The Circle of Innovation*, and that will be the single most important factor shaping the economy for the next 50 years. In the short term, demand for long-distance carriers will continue to grow at the same time that the capacity of every fiber strand is more than doubling every year. The Internet growth driving demand for backbone capacity is particularly high.

Laser pulses transmit data along the hair-thin glass fibers. Each strand of fiber-optic cable can now move data at a very high speed. Voice and data traffic on the North American long-distance backbone now approximates 1 terabit—each strand of new fiber-optic cable may be able to carry that much. Cables often contain ninety-six strands of fiber, but some have as many as 436 strands. Capacity should catch up with demand within the first decade of the twenty-first century. Indeed there should be a glut of capacity. And that means continually declining prices. The trick in this business segment will be to offer very low prices and have very low costs.

SEE ALSO: Computer Networks; Technology Management; Technology Transfer

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THEORY X AND THEORY Y

Theory X and Theory Y represent two sets of assumptions about human nature and human behavior that are relevant to the practice of management. Theory X represents a negative view of human nature that assumes individuals generally dislike work, are irresponsible, and require close supervision to do their jobs. Theory Y denotes a positive view of human nature and assumes individuals are generally industrious, creative, and able to assume responsibility and exercise self-control in their jobs. One would expect, then, that managers holding assumptions about human nature that are consistent with Theory X might exhibit a managerial style that is quite different than managers who hold assumptions consistent with Theory Y.

The first section explains the development of Theory X and Theory Y. Second, the effect of Theory X and Theory Y on management functions is discussed. Third is a criticism of Theory Y followed by the concluding section, Theory X and Theory Y in the twenty-first century.

CONCEPTUALIZATION AND DEVELOPMENT

After the Hawthorne experiments and the subsequent behavioral research of the 1930s and 1940s, the human relations approach to management joined the classical perspective as a major school of management thought. Whereas the classical school as espoused by management pioneers such as Frederick Taylor and Henri Fayol focused on principles of management, scientific selection and training, and worker compensation, the human relations approach emphasized behavioral issues such as job satisfaction, group norms, and supervisory style.

The human relations model was hailed as a more enlightened management paradigm because it explicitly considered the importance of individual and how managers could increase productivity by increasing workers' job satisfaction. The end goal for management increased employee productivity; the assumption was that satisfied workers would be more productive compared with workers who felt antagonized by the companies they worked for.

In the 1950s, Douglas McGregor (1906-1964), a psychologist who taught at MIT and served as president of Antioch College from 1948-1954, criticized both the classical and human relations schools as inadequate for the realities of the workplace. He believed that the assumptions underlying both schools represented a negative view of human nature and that another approach to management based on an entirely

different set of assumptions was needed. McGregor laid out his ideas in his classic 1957 article “The Human Side of Enterprise” and the 1960 book of the same name, in which he introduced what came to be called the new humanism.

McGregor argued that the conventional approach to managing was based on three major propositions, which he called Theory X:

1. Management is responsible for organizing the elements of productive enterprise—money, materials, equipment, and people—in the interests of economic ends.
2. With respect to people, this is a process of directing their efforts, motivating them, controlling their actions, and modifying their behavior to fit the needs of the organization.
3. Without this active intervention by management, people would be passive—even resistant—to organizational needs. They must therefore be persuaded, rewarded, punished, and controlled. Their activities must be directed. Management’s task was thus simply getting things done through other people.

According to McGregor, these tenets of management are based on less explicit assumptions about human nature. The first of these assumptions is that individuals do not like to work and will avoid it if possible. A further assumption is that human beings do not want responsibility and desire explicit direction. Additionally, individuals are assumed to put their individual concerns above that of the organization for which they work and to resist change, valuing security more than other considerations at work. Finally, human beings are assumed to be easily manipulated and controlled. McGregor contended that both the classical and human relations approaches to management depended this same set of assumptions. He called the first style of management “hard” and identified its methods as close supervision, tight controls, and coercion.

The hard style of management led to restriction of output, mutual distrust, unionism, and even sabotage. McGregor called the second style of management “soft” and identified its methods as permissiveness and need satisfaction. McGregor suggested that the soft style of management often led to managers’ failure to perform their managerial role. He also pointed out that employees often take advantage of an overly permissive manager by demanding more but performing at lower levels.

McGregor drew upon the work of Abraham Maslow (1908-1970) to explain why Theory X assumptions led to ineffective management. Maslow had proposed that man’s needs are arranged in levels, with physical and safety needs at the bottom of the needs

hierarchy and social, ego, and self-actualization needs at upper levels of the hierarchy. Maslow’s basic point was that once a need is met, it no longer motivates behavior; thus, only unmet needs are motivational. McGregor argued that most employees already had their physical and safety needs met and that the motivational emphasis had shifted to the social, ego, and self-actualization needs. Therefore, management had to provide opportunities for these upper-level needs to be met in the workplace, or employees would not be satisfied or motivated in their jobs.

Such opportunities could be provided by allowing employees to participate in decision making, by redesigning jobs to make them more challenging, or by emphasizing good work group relations, among other things. According to McGregor, neither the hard style of management based on the classical school nor the soft style of management inspired by the human relations movement were sufficient to motivate employees. Thus, he proposed a different set of assumptions about human nature as it pertains to the workplace.

McGregor put forth these assumptions, which he believed could lead to more effective management of people in the organization, under the rubric of Theory Y. The major propositions of Theory Y include the following:

1. Management is responsible for organizing the elements of productive enterprise—money, materials, equipment, and people—in the interests of economic ends.
2. People are not by nature passive or resistant to organizational needs. They have become so as a result of experience in organizations.
3. The motivation, potential for development, capacity for assuming responsibility, and readiness to direct behavior toward organizational goals are all present in people—management does not put them there. It is a responsibility of management to make it possible for people to recognize and develop these human characteristics for themselves.
4. The essential task of management is to arrange organizational conditions and methods of operation so that people can achieve their own goals by directing their efforts toward organizational objectives.

Thus, Theory Y has at its core the assumption that the physical and mental effort involved in work is natural and that individuals actively seek to engage in work. It also assumes that close supervision and the threat of punishment are not the only means or even the best means for inducing employees to exert productive effort. Instead, if given the

opportunity, employees will display self-motivation to put forth the effort necessary to achieve the organization's goals. Thus, avoiding responsibility is not an inherent quality of human nature; individuals will actually seek it out under the proper conditions. Theory Y also assumes that the ability to be innovative and creative exists among a large, rather than a small segment of the population. Finally, it assumes that rather than valuing security above all other rewards associated with work, individuals desire rewards that satisfy their self-esteem and self-actualization needs.

Although McGregor did not believe that it was possible to create a completely Theory Y-type organization in the 1950s, he did believe that Theory Y assumptions would lead to more effective management. He identified several approaches to management that he felt were consistent with the precepts of Theory Y. These included decentralization of decision-making authority, delegation, job enlargement, and participative management. Job enrichment programs that began in the 1960s and 1970s also were consistent with the assumptions of Theory Y.

In the 1970s, 1980s, and 1990s, McGregor's conceptualization of Theory X and Theory Y were often used as the basis for discussions of management style, employee involvement, and worker motivation. Empirical evidence concerning the validity of Theory X and Theory Y, however, was mixed. Some writers suggested that organizations implementing Theory Y tended to revert back to Theory X in tough economic times.

Others suggested that Theory Y was not always more effective than Theory X, but that the contingencies of each managerial situation determined which of the approaches was more appropriate. Still others suggested extensions to Theory Y. One of these, William Ouchi's Theory Z, attempted to combine the strength of American management philosophies based on Theory Y with Japanese management philosophies.

Along with writers such as Argyris and Likert, McGregor was one of several important humanist writers of the mid-twentieth century who argued that traditional organizational hierarchies create a state of dependence between subordinates and their managers and served as a bridge between the human relations school and a new form of organizational humanism based on Theory Y.

EFFECT ON MANAGEMENT FUNCTIONS

In their well-known textbook, Harold Koontz and Cyril O'Donnell illustrated how the managerial functions of planning, leading, and controlling might be affected by Theory X and Theory Y assumptions. In

regard to planning, Theory X assumptions might lead to the superior setting of objectives with little or no participation from subordinates. Theory Y assumptions, conversely, should lead to cooperative objectives designed with input from both employees and managers, resulting in a higher commitment by subordinates to accomplish these shared objectives.

Under Theory X, managers' leadership styles are likely to be autocratic, which may create resistance on the part of subordinates. Communication flow is more likely to be downward from manager to the subordinates. In contrast, Theory Y may foster leadership styles that are more participative, which would empower subordinates to seek responsibility and be more committed to goal achievement. Theory Y leadership should increase communication flow, especially in the upward direction.

In regard to control, Theory X is likely to result in external control, with the manager acting as a performance judge; the focus is generally on the past. Conversely, Theory Y should lead to control processes based on subordinates' self-control. The manager is more likely to act as a coach rather than a judge, focusing on how performance can be improved in the future rather than on who was responsible for past performance. Although the conceptual linkages between Theory X and Theory Y assumptions and managerial styles are relatively straightforward, empirical research has not clearly demonstrated that the relationship between these assumptions and managers' styles of planning, organizing, leading, and controlling is consistent with McGregor's ideas.

CRITICISM OF THEORY Y

The goal of managers using Theory X management styles was to accomplish organizational goals through the organization's human resources. McGregor's research suggested that when work was better aligned with human needs and motivations, employee productivity would increase. As a result, some critics have suggested that, rather than concern for employees, Theory Y style managers were simply engaged in a seductive form of manipulation. Even as managers better matched work tasks to basic human motivational needs through participative management, job rotation, job enlargement, and other programs that emerged at least partly from McGregor's work, managers were still focusing on measures of productivity rather than measures of employee well-being. In essence, critics charge that Theory Y is a condescending scheme for inducing increased productivity from employees, and unless employees share in the economic benefits of their increased productivity, then they have simply been duped into working harder for the same pay.

THEORY X AND THEORY Y IN THE TWENTY-FIRST CENTURY

McGregor's work on Theory X and Theory Y has had a significant impact on management thought and practice in the years since he first articulated the concepts. In terms of the study of management, McGregor's concepts are included in the overwhelming majority of basic management textbooks, and they are still routinely presented to students of management. Most textbooks discuss Theory X and Theory Y within the context of motivation theory; others place Theory X and Theory Y within the history of the organizational humanism movement.

Theory X and Theory Y are often studied as a prelude to developing greater understanding of more recent management concepts, such as job enrichment, the job-characteristics model, and self-managed work teams. Although the terminology may have changed since the 1950s, McGregor's ideas have had tremendous influence on the study of management.

In terms of the practice of management, the workplace of the early twenty-first century, with its emphasis on self-managed work teams and other forms of worker involvement programs, is generally consistent with the precepts of Theory Y. There is every indication that such programs will continue to increase, at least to the extent that evidence of their success begins to accumulate.

SEE ALSO: Theory Z

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THEORY Z

Theory Z is an approach to management based upon a combination of American and Japanese management philosophies and characterized by, among other things, long-term job security, consensual decision

making, slow evaluation and promotion procedures, and individual responsibility within a group context. Proponents of Theory Z suggest that it leads to improvements in organizational performance. The following sections highlight the development of Theory Z, Theory Z as an approach to management including each of the characteristics noted above, and an evaluation of Theory Z. Realizing the historical context in which Theory Z emerged is helpful in understanding its underlying principles. The following section provides this context.

DEVELOPMENT OF THEORY Z

Theory Z has been called a sociological description of the humanistic organizations advocated by management pioneers such as Elton Mayo, Chris Argyris, Rensis Likert, and Douglas McGregor. In fact, the descriptive phrase, "Theory Z," can be traced to the work of Douglas McGregor in the 1950s and 1960s. McGregor, a psychologist and college president, identified a negative set of assumptions about human nature, which he called Theory X. He asserted that these assumptions limited the potential for growth of many employees.

McGregor presented an alternative set of assumptions that he called Theory Y and were more positive about human nature as it relates to employees. In McGregor's view, managers who adopted Theory Y beliefs would exhibit different, more humanistic, and ultimately more effective management styles. McGregor's work was read widely, and Theory Y became a well-known prescription for improving management practices.

But in the 1970s and 1980s, many United States industries lost market share to international competitors, particularly Japanese companies. Concerns about the competitiveness of U. S. companies led some to examine Japanese management practices for clues to the success enjoyed by many of their industries. This led to many articles and books purporting to explain the success of Japanese companies. It was in this atmosphere that Theory Z was introduced into the management lexicon.

Theory Z was first identified as a unique management approach by William Ouchi. Ouchi contrasted American types of organizations (Type A) that were rooted in the United States' tradition of individualism with Japanese organizations (Type J) that drew upon the Japanese heritage of collectivism. He argued that an emerging management philosophy, which came to be called Theory Z, would allow organizations to enjoy many of the advantages of both systems. Ouchi presented his ideas fully in the 1981 book, *Theory Z: How American Companies Can Meet the Japanese Challenge*. This book was among the best-selling management books of the 1980s.

Professor Ouchi advocated a modified American approach to management that would capitalize on the best characteristics of Japanese organizations while retaining aspects of management that are deeply rooted in U.S. traditions of individualism. Ouchi cited several companies as examples of Type Z organizations and proposed that a Theory Z management approach could lead to greater employee job satisfaction, lower rates of absenteeism and turnover, higher quality products, and better overall financial performance for U.S. firms adapting Theory Z management practices. The next section discusses Ouchi's suggestions for forging Theory Z within traditional American organizations.

THEORY Z AS AN APPROACH TO MANAGEMENT

Theory Z represents a humanistic approach to management. Although it is based on Japanese management principles, it is not a pure form of Japanese management. Instead, Theory Z is a hybrid management approach combining Japanese management philosophies with U.S. culture. In addition, Theory Z breaks away from McGregor's Theory Y. Theory Y is a largely psychological perspective focusing on individual dyads of employer-employee relationships while Theory Z changes the level of analysis to the entire organization.

According to Professor Ouchi, Theory Z organizations exhibit a strong, homogeneous set of cultural values that are similar to clan cultures. The clan culture is characterized by homogeneity of values, beliefs, and objectives. Clan cultures emphasize complete socialization of members to achieve congruence of individual and group goals. Although Theory Z organizations exhibit characteristics of clan cultures, they retain some elements of bureaucratic hierarchies, such as formal authority relationships, performance evaluation, and some work specialization. Proponents of Theory Z suggest that the common cultural values should promote greater organizational commitment among employees. The primary features of Theory Z are summarized in the paragraphs that follow.

LONG-TERM EMPLOYMENT

Traditional U.S. organizations are plagued with short-term commitments by employees, but employers using more traditional management perspective may inadvertently encourage this by treating employees simply as replaceable cogs in the profit-making machinery. In the United States, employment at will, which essentially means the employer or the employee can terminate the employment relationship at any time, has been among the dominant forms of employment relationships. Conversely, Type J organizations generally make life-long commitments to their employees and

expect loyalty in return, but Type J organizations set the conditions to encourage this. This promotes stability in the organization and job security among employees.

CONSENSUAL DECISION MAKING

The Type Z organization emphasizes communication, collaboration, and consensus in decision making. This marks a contrast from the traditional Type A organization that emphasizes individual decision-making.

INDIVIDUAL RESPONSIBILITY

Type A organizations emphasize individual accountability and performance appraisal. Traditionally, performance measures in Type J companies have been oriented to the group. Thus, Type Z organizations retain the emphasis on individual contributions that are characteristic of most American firms by recognizing individual achievements, albeit within the context of the wider group.

SLOW EVALUATION AND PROMOTION

The Type A organization has generally been characterized by short-term evaluations of performance and rapid promotion of high achievers. The Type J organization, conversely, adopts the Japanese model of slow evaluation and promotion.

INFORMAL CONTROL WITH FORMALIZED MEASURES

The Type Z organization relies on informal methods of control, but does measure performance through formal mechanisms. This is an attempt to combine elements of both the Type A and Type J organizations.

MODERATELY SPECIALIZED CAREER PATH

Type A organizations have generally had quite specialized career paths, with employees avoiding jumps from functional area to another. Conversely, the Type J organization has generally had quite non-specialized career paths. The Type Z organization adopts a middle-of-the-road posture, with career paths that are less specialized than the traditional U.S. model but more specialized than the traditional Japanese model.

HOLISTIC CONCERN

The Type Z organization is characterized by concern for employees that goes beyond the workplace. This philosophy is more consistent with the Japanese model than the U.S. model.

EVALUATION OF THEORY Z

Research into whether Theory Z organizations outperform others has yielded mixed results. Some studies suggest that Type Z organizations achieve benefits both in terms of employee satisfaction, motivation, and commitment as well as in terms of financial performance. Other studies conclude that Type Z organizations do not outperform other organizations.

Difficulties in the Japanese economy in the 1990s led some researchers to suggest that the widespread admiration of Japanese management practices in the 1970s and 1980s might have been misplaced. As a result, Theory Z has also received considerable criticism. It is unclear whether Theory Z will have a lasting impact on management practices in the U. S. and around the world into the twenty-first century, but by positioning target research at the organizational level rather than the individual level, Ouchi will surely leave his mark on management practice for years to come.

SEE ALSO: Empowerment; Japanese Management; Theory X and Theory Y

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Revised by Scott B. Droege

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THEORY OF CONSTRAINTS

The Theory of Constraints (TOC) is a management philosophy developed by Dr. Eliyahu Moshe Goldratt. According to Goldratt the strength of any chain, process, or system is dependent upon its weakest link. TOC is systemic and strives to identify constraints to system success and to effect the changes necessary to remove them. Dr. Goldratt and the TOC became widely known with the 1984 publication of Goldratt's novel *The Goal*.

HISTORY

In early 1979 Goldratt introduced a software-based manufacturing scheduling program known as Optimized Production Timetables (OPT), changed in 1982 to Optimized Production Technology. With the publication of *The Goal*, Goldratt used his Socratic teaching style to educate the world about managing bottlenecks (constraints) and his new ideas about performance. *The Goal*, is a love story set in the manufacturing industry (thrice revised) detailing the tribulations of a plant manager named Alex Rogo. Rogo is faced with the shutdown of his hometown manufacturing plant. Goldratt uses Rogo's predicament to introduce his principles, which result not only in the rescue of Rogo's plant, but also in the salvation of Rogo's marriage. Goldratt himself appears in the book as a character known as Jonah, Rogo's old college professor.

Goldratt used three additional novels to refine and develop the principles set forth in *The Goal*. *It's Not Luck*, a sequel to *The Goal*, addresses changing markets and introduces a number of methods of logical thinking that are used to make decisions, solve problems, and resolve conflict. *The Critical Chain* depicts a situation whereby TOC principles are effectively utilized in project management. *Necessary But Not Sufficient* contains Goldratt's most holistic expression of TOC and deals with the role of technology in organizations.

Goldratt also produced a number of nonliterary works that espouse his ideas. *The Race*, introduced the concept of the drum-buffer-rope and buffer management. *Essays on the Theory of Constraints, What Is This Thing Called Theory of Constraints and How Should It Be Implemented?* and *The Haystack Syndrome: Sifting Information Out of the Data Ocean* were used, among other publications, to introduce the thinking processes and other TOC concepts.

COMPONENTS OF THE THEORY OF CONSTRAINTS

Theory of constraints consists of separate, but related processes and interrelated concepts, including the following: the performance measures and five focusing steps, logical thinking processes, and logistics.

PERFORMANCE MEASURES. According to Goldratt there are three key performance measurements to evaluate: throughput, inventory and operating expense. TOC emphasizes the use of these three global operational measures rather than local measures (e.g., efficiency and utilization). Goldratt places the greatest importance on increasing throughput. Throughput is defined as the rate at which the system generates money through sales, not through production. Goods

are not considered an asset until sold. This contradicts the common accounting practice of listing inventory as an asset even if it may never be sold. Goldratt has advocated a new accounting model as an alternative to traditional cost accounting procedures and measures. Inventory is defined as the money invested in goods that the firm intends to sell or material that the firm intends to convert into salable items. The concept of value-added and overhead are not considered. Operating expense includes all the money the firm spends converting inventory into throughput. The objective of the firm, therefore, is to increase throughput and/or decrease inventory and operating expense in such a way as to increase profit, return on investment, and cash flow (more global measures). In *The Goal*, Alex explains to Jonah that his plant's use of a robot has resulted in a thirty six percent improvement in one area. Jonah then asks if Alex is now able to ship more products, and if he has fired any employees or reduced inventory as a result (in other words, whether increased throughput, reduced operating expense, or reduced inventory resulted). When the reply was no, Jonah questions how there can be any real improvement; and of course, there can't.

Increasing throughput and/or decreasing inventory or operating expense should lead to the accomplishment of the firm's goal: to make money now as well as in the future. Anything that prevents a firm from reaching this goal is labeled as a constraint. Constraints may appear in the form of capacity, material, logistics, the market (demand), behavior, or even management policy. TOC thinking regards all progress toward the goal of making money as relating directly to management attention toward the constraint(s). The marginal value of time at a constraint resource is said to be equal to the throughput rate of the product processed at the constraint, while the marginal value of time at a non-constraint resource is said to be negligible.

FIVE FOCUSING STEPS. The five focusing steps are a tool Goldratt developed to help systems deal with constraints. These steps ensure improvement efforts remains on track towards system-level improvements. Dettmer believes that these are collectively the most important aspect of TOC. TOC's five focusing steps are:

- Step 1: Identify the system's constraint(s).
- Step 2: Decide how to exploit the system's constraint(s).
- Step 3: Subordinate everything else to the decisions made in Step 2.
- Step 4: Elevate the system's constraint(s)
- Step 5: If a constraint is broken in Step 4, go back to Step 1, but do not allow inertia to cause a new constraint.

The orientation of TOC is toward the output of the entire system, rather than a look at a discrete unit or component. The five focusing steps assist with identifying the largest constraint that overshadows all of the others. These steps constitute an iterative process. As soon as one constraint is strengthened, the next weakest link becomes the priority constraint and should be addressed. Thus, a process of ongoing system improvement is applied to the business practice of the firm.

LOGICAL THINKING PROCESS. Goldratt introduced a staged logical thinking process to be used in conjunction with the five focusing steps. The thinking process assists with working through the change process by identifying the following: what to change, what to change to, and how to effect the change. The thinking processes consist of logic tools used to identify problems, then develop and implement solutions. These tools include effect-cause-effect (ECE) diagramming and its components: negative branch reservations, the current reality tree, the future reality tree, the prerequisite tree, the transition tree, the evaporating cloud, the negative branch reservation, and the ECE audit process. These tools allow an organization to analyze and to verbalize cause and effect.

The following is a brief description of the thinking process. A current reality tree, a cause-effect diagram, is drawn in order to discover the problems. These problems are known as undesirable effects. The cause of an undesirable effect is known as a root cause. The first goal is to find the causes of these undesirable effects. Each statement in a current reality tree that is not a derivative of another must be a root cause. If you build a tree that is comprehensive enough, at least one root cause will lead to most of the undesirable effects. This particular root cause is labeled a core problem, the major improvement target. The fewer root causes responsible for the undesirable effects, the better. The solution to this core problem is apparently not readily available. If it were, then the problem would have already been solved. Some conflict, therefore, must exist that prevents an immediate solution. This conflict becomes evident upon the construction of an evaporating cloud.

An evaporating cloud is a conflict-resolution tool. The process begins with a statement of the desired objective, one that is the opposite of the core problem. Then, the prerequisites necessary to achieve the requirements are listed. Any conflicts and assumptions that exist between the prerequisites are verbalized. For example, if one objective is to increase profit, then the requirements may be to improve the product and to decrease expenses. Prerequisites for each, respectively, might be to increase expenditures on capital equipment and to decrease expenditures, two obviously conflicting elements. The best solution is to remove the

conflict; a compromise is not desirable. The next move involves finding an injection, a breakthrough idea that will evaporate the cloud. The “evaporating” refers to the tool’s ability to dissipate conflict and to create a win-win solution. Usually, the original injection is not sufficient to fully solve the problem, but additional needed injections become clear when building the future reality tree.

A future reality tree is another cause-effect diagram. The tree starts with the proposed solution to the core problem and delineates the injection(s) and the ensuing desirable effects. The future reality tree is a “what if.” It provides the opportunity to evaluate and to improve a solution before it is implemented. It is noted that one should be careful not to allow the solution to cause new undesirable effects.

A prerequisite tree describes the implementation of the injection(s) and is composed of an obstacle and an intermediate objective. This diagram breaks the implementation tasks into smaller increments, noting expected obstacles and intermediate objectives whose accomplishments will overcome the obstacles. The intermediate objectives are sequenced, displaying the necessary order of accomplishment and determining which ones can be achieved in parallel. This tool is powerful in that it does not ignore the obstacles. It uses them, rather, as the main vehicle for this phase.

Finally, a transition tree or implementation plan is constructed. This element presents a detailed description of the gradually evolving change envisioned. This task forces one to carefully examine which actions are really needed and if they are sufficient to guarantee the required change.

The thinking-process tools are powerful resources when used effectively. They have found successful use in the logistics and medicine areas of the United States Air Force, in primary education, and in the service sector. James Cox and Michael Spencer, both college professors and “Jonahs,” state in *The Constraints Management Handbook* that the thinking processes may be the most important management tools developed this century.

LOGISTICS.

Logistics in TOC include drum-buffer-rope scheduling, buffer management, and VAT analysis.

DRUM-BUFFER-ROPE. Drum-buffer-rope is a TOC production application and the name given to the method used to schedule the flow of materials in a TOC facility. Srikanth and Umble (1997), define each component as follows:

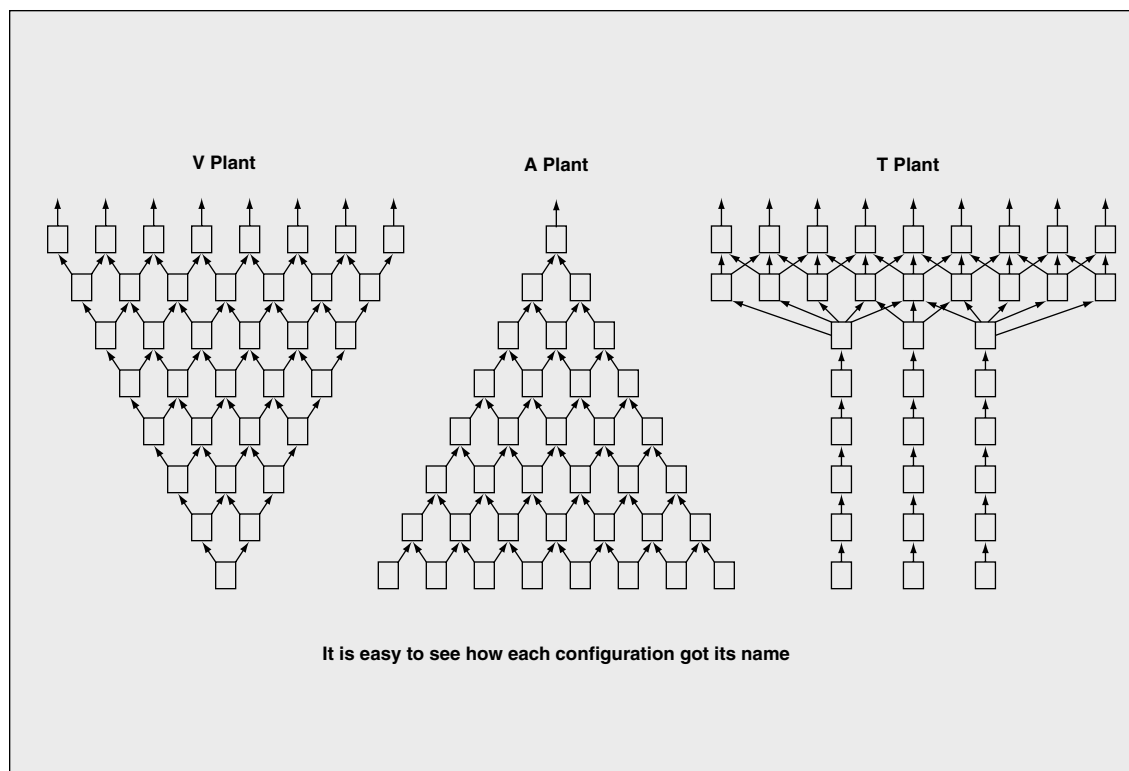
- **Drum.** The drum is the constraint and therefore sets the pace for the entire system. The drum must reconcile the customer require-

ments with the system’s constraints. In simpler terms, the drum is the rate or pace of production set by the system’s constraint.

- **Buffer.** A buffer includes time or materials that support throughput and/or due date performance. A buffer establishes some protection against uncertainty so that the system can maximize throughput. A time buffer is the additional planned lead time allowed, beyond the required setup and run times, for materials to reach a specified point in the product flow. Strategically placed, time buffers are designed to protect the system throughput from the internal disruptions that are inherent in any process. A stock buffer is defined as inventories of specific products that are held in finished, partially finished, or raw material form, in order to fill customer orders in less than the normal lead-time. Stock buffers are designed to improve the responsiveness of the system to specific market conditions.
- **Rope.** The rope is a schedule for releasing raw materials to the floor. The rope is devised according to the drum and the buffer. The rope ensures that non-capacity constraint resources are subordinate to the constraint. Restated, the rope is a communication process from the constraint to the gating operation that checks or limits material released into the system to support the constraint.

BUFFER MANAGEMENT. Buffer management provides the means by which the schedule is managed on the shop floor. Buffer management is a process in which all expediting in a shop is motivated by what is scheduled to be in the buffers (constraint, shipping, and assembly buffers). Buffers can be maintained at the constraint, convergent points, divergent points, and shipping points. By expediting this material into the buffers, the system helps to avoid idleness at the constraint and missed customer due dates. Also, the causes of items missing from the buffer are identified, and the frequency of occurrences is used to prioritize improvement activities.

VAT ANALYSIS. VAT analysis determines the general flow of parts and products from raw materials to finished products. It conceptualizes an organization in terms of the interaction of its individual component parts, both products and processes. Three general categories of production structures result from this standpoint, each necessitating a unique approach to management planning and control. The logical structure is the sequence of operations through which each product must pass in order to manufacture and assemble a product or product family. A V logical structure starts with one or a few raw materials, and the product



expands into a number of different products as it flows through its routings. The shape of an *A* logical structure is dominated by converging points. Many raw materials are fabricated and assembled into a few finished projects. A *T* logical structure consists of numerous similar finished products assembled from common assemblies and subassemblies. The graph shows the general appearance of each structure. Once the general parts flow is determined, the system control points (gating operations, convergent points, divergent points, constraints, and shipping points) can be identified and managed. This determination focuses management's attention on a few control points where buffers can be used to protect and to maximize throughput. Five control points are used to manage the process: (1) the constraint, (2) the points of divergence (where a part or material is diverted to different routes in order to make different products), (3) the points of convergence (where two or more parts are combined in subassembly), (4) the gating operation (releases work into the shop), and (5) the shipping operation.

The shape of the structure determines which control points are utilized to manage production. A *T* structure focuses attention on the constraint and the gating operation. The five-step focusing process is used to manage the constraint with a buffer placed before the constraint to absorb variations in the process. The output from the gating operation is tied to the constraint; that is, since the constraint controls the amount of throughput; the gating operation cannot process more than the constraint.

A *V* structure also uses a buffer to protect the constraint and the gating operation releases orders at the same rate as the constraint as seen in the *T* structure. However, an additional control point exists in the *V* structure, the divergent point. The divergent point is controlled by a schedule derived from the shipping schedule. This derivation prevents misallocation of material to a product not currently in demand.

The *A* structure also manages the constraint and gating operation in a fashion similar to the *T* structure. Any diverging points are scheduled in accordance with the shipping schedule. In addition, an assembly buffer is used to maintain the flow into the convergent points. An additional schedule based on the shipping schedule (similar to that used in the *V* structure) is used to keep capacity from being misallocated to the wrong order. By using VAT analysis, significant improvements in the production process can result.

The unexpected and enormous success of *The Goal*, initially published in a small run of 3,000 copies and has now sold more than 2 million copies, and further development of TOC has led many organizations to put TOC theory into practice. Over the past two decades a growing number of books, articles, and dissertations have appeared elaborating on Dr. Goldratt's philosophy and providing examples of TOC principles in use. Followers of Goldratt's philosophy, those who have completed an extensive training course conducted by Goldratt's educational firm, the Avraham Y. Goldratt Institute, refer to themselves as Jonahs. TOC materials are available in multiple languages and

formats, including videotapes, audiotapes, and computer software.

SEE ALSO: Inventory Management; Inventory Types; Manufacturing Resources Planning; Operations Scheduling; Operations Strategy

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TIME-BASED COMPETITION

The widespread use of just-in-time production (JIT) and other advanced manufacturing techniques has been credited with providing such improvements as decreased inventories, set-up times, downtime and workspace. These decreases have yielded increases in inventory turns, equipment utilization, labor utilization, and ultimately, profit. Simply stated, this means

that finished goods are produced and delivered just in time to be sold, subassemblies just in time to be assembled into finished goods, fabricated parts just in time to go into subassemblies and raw materials just in time to be transformed into fabricated parts. In effect, consumption of time has been reduced. While the JIT philosophy dictates that improvement in these areas be part of a continuous process, it does not have to stop there. Some firms have reduced the consumption of time, not only in the production area, but also throughout the system. Firms that manage this have gone beyond JIT and its competitive advantages. They have an advantage in time-based competition.

WHAT IS TIME-BASED COMPETITION?

JIT was the first manifestation of time-based competition. Time-based competition is the extension of JIT into every facet of the product delivery cycle, from research and development through marketing and distribution of the final product. Even quality, while still critical to success, is not the competitive advantage it once was in many industries. Manufacturing firms then have three strategic options: seek coexistence, retreat in the face of competitors, or attack (directly or indirectly). It has been said that strategy is and always has been a moving target. For some firms who choose to attack, this target has moved to speed and time-based competition.

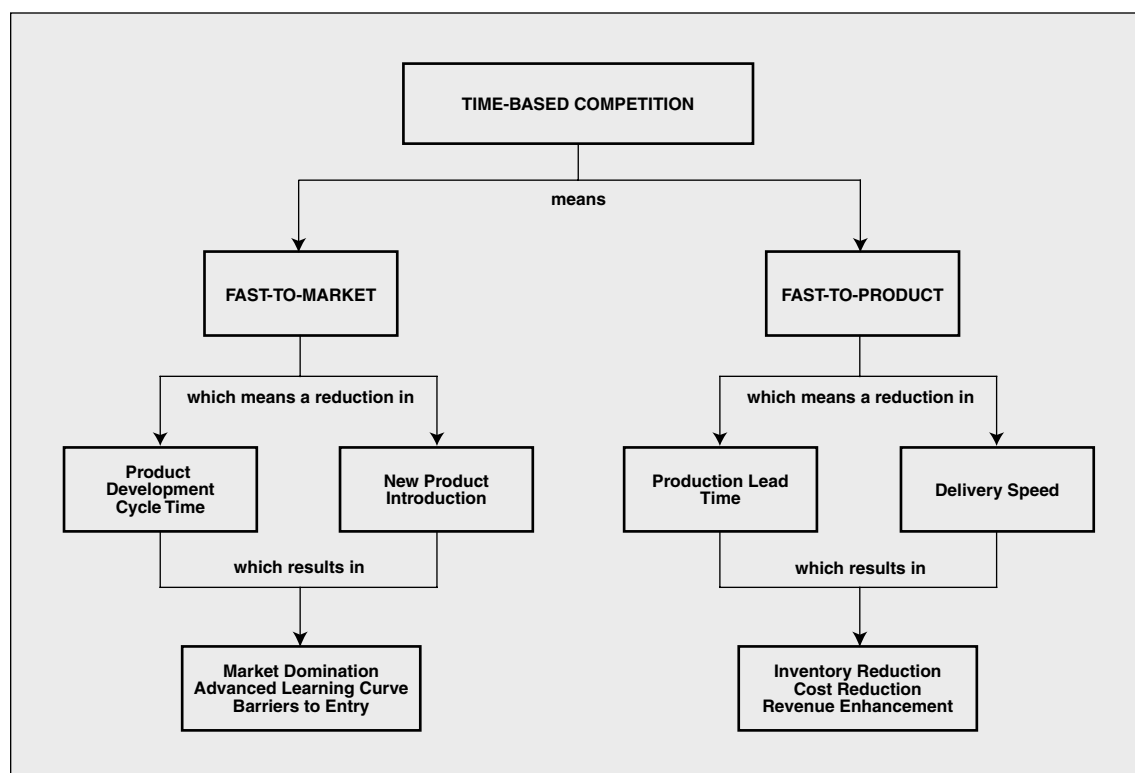
The term *time-based competition* came into use with its appearance in a 1988 *Harvard Business*

Review article entitled “Time-The Next Source of Competitive Advantage” by George Stalk, Jr. It was further defined in a series of articles and books written by consultants from the Boston Consulting Group.

Time-based competition is a broad-based competitive strategy which emphasizes time as the major factor for achieving and maintaining a sustainable competitive advantage. It seeks to compress the time required to propose, develop, manufacture, market and deliver its products.

In order to do this, the firm must change its current processes and alter the decision structures used to design, produce and deliver to the customer.

Time-based competition appears in two different forms: fast to market and fast to produce. Firms that compete with to-market speed emphasize reductions in design lead-time. In other words, the firm has the ability to minimize the time it takes to develop new products or make rapid design changes. Products fifty percent over budget but introduced on time have been found to generate higher profit levels than products brought to market within budget but six months late. Also, this form allows firms to gain a market edge by being able to consistently introduce more new products or large numbers of product improvements/variations faster than its competitors, thereby dominating the market. Sun Microsystems achieved leadership in engineering workstations by reducing (by fifty percent compared to competitors) the time required to design and introduce new systems. Additionally, these firms



are now moving further along the learning curve than the competition. Both factors ultimately increase barriers to entry by competitors.

Fast-to-product firms emphasize speed in responding to customer demands for existing products. Wal-Mart has been able to dominate its industry by replenishing its stores twice as fast as its competitors. Firms competing in this area focus on lead-time reduction throughout the system, from the time the customer places an order until the customer ultimately receives the product. This includes the ability to reduce the time it takes to manufacture products (throughput time) as well as the ability to reduce the time between taking a customer's order and actually delivering the product (delivery speed). These reductions in lead-time are usually accompanied by significant reductions in inventory levels. As with JIT, there is less rework, fewer supervisors, lower carrying costs, less overhead, and so forth, as well as enhanced quality and on-time delivery performance. Some customers, known as impatient customers, place a great deal of value on reduced lead-time. These customers are willing to pay a premium to get their goods and services quickly. This combination of lower costs and higher revenues contributes significantly to an improved corporate performance.

While product development cycle time, new product introduction, production lead time, and delivery speed all contribute to improved business performance, not all contribute equally. A study by Shawnee Vickery, Cornelia Droge, James Yeomans, and Robert Markland found that the most consistent predictor of business performance was new product introduction. The second best predictor was product development cycle time. While production lead time and delivery speed were found to be related to business performance (respectively, in order of contribution), their relationship to business performance was not as significant as the other two factors.

The production cycle encompasses order entry through the completion of all paperwork, through finished goods all the way to distribution of the final product. JIT methods greatly reduce the amount of time consumption from initiation of the purchase order through the transformation process, but improvement in these other areas have much potential. Studies have shown that few companies have value-added time in excess of 10 percent of average order cycle times. In fact, 95 to 99 percent of the time a product or service is not receiving value, it is waiting. Hence, time can be removed from any part of the product cycle.

Some firms have traced the complete order entry process only to find that it took longer to complete the paperwork than it did to manufacture the product. One major manufacturer compressed its manufacturing

processes but still took months to convert a customer order into an approved order for manufacture. Time reductions resulting from JIT success are worth much less when orders sit at the retailer for weeks, float in the mail for a week, sit at the distributor for a week, float in the mail for another week and then begin the now shortened transformation process at the factory.

Paperwork is subject to the same delays. When paperwork moves in batches (similar to manufacturing), several days of delay can develop while the order sits in a stack awaiting enough volume for the batch to move on to the next stage in processing. Time-based competitors begin by eliminating all unnecessary paperwork. Incoming mail is categorized as fast or slow track, allowing the fast track orders to be handled immediately. Also, some firms structure the paperwork process so that transactions are handled one at a time, eliminating the delay caused from batch movement. A door manufacturer managed to refine its process to the point that it could price and schedule 95 percent of incoming orders during the initial customer call.

Frequently, when delays occur, the delay time is made up at the end of the product cycle. Obviously, the last place to make up for lost time is at the distribution and transportation stage (similar to the way a delayed airline flight might make up for delayed take-offs and manage to still land on time). If time can be reduced in these emergency situations, why not reduce it permanently and reap the benefits of time-based competition?

IMPLEMENTATION

George Stalk, Jr. relates that a firm becomes a time-based competitor by accomplishing four tasks: (1) understanding the rules of response, (2) making value-delivery systems two to three times as flexible and responsible as its competitors, (3) pricing how customers value these capabilities, and (4) implementing a strategy for surprising its competitors with time-based advantages.

Philip Carter, Steven Melnyk, and Robert Handfield identified seven process strategies for implementing time-based competition. These include: system simplification, system integration, standardization, parallel activities, variance control, automation and excess resources. They feel that by identifying these strategies, they have developed a linkage between lead-time reduction and the tactics needed to achieve this goal.

Shawnee Vickery, Cornelia Droge, James Yeomans and Robert Markland identified 10 steps to guide the implementation of time-based competition. They felt that implementing firms need to

1. perform a thorough process analysis to understand your current business operation;

2. develop measurement system that focuses on time;
3. increase the speed of new product introduction times by using methods such as concurrent engineering and cross-functional teams;
4. evaluate all managerial decision alternatives in terms of time;
5. embrace change and develop change-oriented management practices and methods;
6. understand the critical importance of top management support to sustain change;
7. treat bottlenecks, downtime, and other problems as opportunities to learn;
8. find ways to incorporate time reduction results into the employee reward structure;
9. give employees a better understanding of how their jobs contribute to time compression; and
10. balance improvements with work disruptions in order to keep customers happy.

Some time-based firms rely on technology (e.g., more productive machinery) to reduce lead times while others seek to streamline the system and its processes. For example, Japanese manufacturers focused on single-minute exchange of dies when setting up or changing machines. Still, others use techniques such as team building and alliance building to reduce time by focusing on integrating the various components of the supply chain. Hillman Willis and Anthony Jurkus, in a *Review of Business* article, note that some firms, such as Black and Decker, Ford and AT&T have found success by organizing teams to work, from the time of inception, on an entire family of new products. By bringing together people from product engineering, manufacturing, marketing, and purchasing throughout the development process and giving them the authority to make real decisions, enormous time and expense has been cut from new product efforts. Developing products and manufacturing processes simultaneously collapse time collapsed yet the manufacturability of the product is ensured. Also, this process facilitates the standardization of components across the family of products, thereby making them easier and less costly to assemble. Orders can then be filled by assembling the appropriate set of components, reducing both time and cost by as much as half. One firm has reported that an ad hoc cross-functional team took actions that reduced average cycle time from 18.1 hours to 9.4 hours. This 48 percent reduction in cycle time corresponds to a 92.5 percent increase in productivity.

Other firms are using cutting edge technologies, such as Stream-of-Variation Analysis (SOVA), to facilitate time-based competition. SOVA is a generic math model which integrates multivariate statistics,

control theory and design/manufacturing knowledge into a unified framework to optimize manufacturing performance and identify and isolate causes of dimensional variation which occur during the pre-production stage of a product.

Time-based competition is a reality for many firms. Generally, these time-based competitors began by correcting their manufacturing techniques (often through JIT), then fixing sales and distribution, and finally adjusting their approach to innovation. Their strategy is based on the results of flexible manufacturing, rapid response, expanding variety, and increasing innovation. It is a metastrategy which improves performance through changes in the processes and structures used to design, manufacture and deliver products to the customer, thereby impacting overall firm performance (e.g., return on investment, return on assets). Motorola, Northern Telecom, and Toyota are but a few of the companies that have found ways to increase the overall value of their delivery systems through the compression of time.

One final word of caution: recent studies have suggested that time reductions that are not tied to viable business strategies can needlessly increase costs and dramatically reduce profits.

SEE ALSO: Cycle Time; Lean Manufacturing and Just-in-Time Production; New Product Development

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TIME MANAGEMENT

Many business people struggle with time management and would like to accomplish more tasks in a day, or have more time for non-work activities. There are a number of tips and suggestions for improving time management in a person's workplace and home, and different approaches work for different people.

DELEGATE

Many of us attempt to accomplish tasks that can be easily assigned to or contracted out to someone else. By delegating a task, you can have more time to accomplish other important tasks. When can a task be delegated and when should you attempt it yourself? Some guidelines are as follows. A primary concern is that you should only delegate if there is a person who is skilled enough to do the task at hand. You can delegate to employees you supervise, those who are your colleagues, and even those above you. When you delegate a task to your subordinate—downward delegation—you have the authority to make sure that the task is done correctly, but assigning a task to an employee who lacks the skill to do it will often require more time than if you did the task yourself. Delegating to a peer, or a colleague, works well if you and the other person have complementary skills. You can trade responsibilities if you each have skills that are stronger than the other person's. Although most employees do not consider it, you can also delegate to employees above you in the organizational hierarchy—upward delegation. If you have been assigned a task that should not be yours or a task that is beyond your abilities, you can ask a superior for guidance or clarification. Your feedback may indicate to your supervisor that the task is better done by him or herself.

Another consideration when delegating is the type of task that can be delegated. There are three types of tasks that are best suited to being assigned to someone else: (1) tasks for which you do not have adequate skill or expertise, (2) tasks that you do not want to do but that others might, and (3) tasks that are easy to accomplish but detract from your value to the organization.

First, if someone else can do something more effectively than you can, you will spend too much time attempting to do it yourself. For instance, if you are planning a retirement party for a colleague, you could purchase, prepare, and arrange the food and beverages yourself. However, if you are not very good at preparing food or creating a buffet, it would be to use your time to hire a caterer for this task. In addition to saving the time it takes to purchase and prepare food and drinks, by hiring a reputable caterer, you would spend

considerably less energy managing the task and thinking about it.

A second circumstance that benefits from delegation is if there is a task that another person might enjoy more than you. Again, consider the example of organizing a retirement party. Perhaps you do not enjoy party planning, but your colleague does. You can delegate this task to your colleague, perhaps taking on one of his tasks in return, creating a situation in which both of you feel satisfied with the work you are assigned.

A final situation in which you should delegate is if there is an easy task that takes little skill to accomplish. For instance, if you are sending a mass mailing, it is poor time management for you to stuff the envelopes yourself. A lower-level employee, like an assistant or secretary, might better do this. By allowing this other person to do a task that is easy to complete, you are freed to complete other tasks that require more skill and attention. Since the person to whom you have delegated this task is likely to complete it just as effectively as you would have, then there is no drawback to assigning the task to another.

When should you not delegate? First, you should accomplish your major job tasks. For instance, it may be appropriate for your secretary to stuff envelopes with a letter soliciting business from former clients, but it is not appropriate for this secretary to write the entirety of this letter without your help or final approval. If you consistently have others complete tasks that are supposed to be yours, then you may find yourself replaced by another employee. Second, you should not delegate tasks in which the outcome is critical. If you have tasks that, if not completed, can lose the company a client or money, you must be responsible for this task. If you are accountable for an important outcome, you should use caution when delegating. Finally, there are some tasks for which delegation is too expensive. While hiring a caterer for a party does not represent a large cost, there are other times in which hiring others to complete tasks (e.g., offer training or develop a web site) can be cost prohibitive to some organizations.

PRIORITIZE TASKS

Procrastination, or putting off a task that must be completed, is common to many people, even in business environments. Procrastination occurs for many reasons: you may not know where to start on a task, you may not understand a task, you may dislike the task, or you may worry that you cannot complete a task successfully. Often a person's anxiety about a task leads them to avoid it. Therefore, to accomplish more in a workday, it is best to tackle the most difficult or worrisome task first. This is a beneficial because it allows you to devote the time and mental energy that

is necessary for a difficult or unpleasant task when you are most able to. Furthermore, by reducing the anxiety associated with this task in tackling it early, you will find that work becomes easier. When the unpleasant task is finished, it no longer creates anxiety and worry, which can save time.

If a person leaves unpleasant or difficult tasks until shortly before their deadlines or until the end of the workday, he or she will have less energy to complete this task. Additionally, the anxiety and dread associated with the completion of the task that has been procrastinated may affect a person's ability to complete other tasks throughout the day. The negative emotions associated with the anticipation an unpleasant task is likely to distract a person from the other tasks that they are trying to complete. This can make even easy tasks more time consuming to complete.

SET GOALS

Goals can be very effective ways to meet workplace demands in a timely manner. Goals are measurable, short-term objectives. Simply by setting an appropriate goal, you can better organize your day or week. Decades of research have supported the effectiveness of goal setting on performance in a variety of tasks. However, for a goal to be effective, it must be designed properly by being specific and difficult. Specific goals are much more effective than non-specific goals, because your progress can be assessed. For instance, setting a goal of reading 20 pages of a report is a good goal because you can determine whether or not it was accomplished. If your goal was to "read a lot of the report" then you might determine 5 pages into it, that you had accomplished that goal, when in reality, you had not read enough. Goals should also be difficult, but not too challenging. A goal that is too easy, such as "respond to one e-mail today" are not motivating because they present no challenge at all. Overly difficult goals (e.g., "improve my sales by 50 percent in one month") are also not motivational; they are so challenging that a person may give up too soon, realizing they will never reach the goal. In addition to being appropriately specific and difficult, you are more likely to reach goals to which you are committed. A lack of interest or commitment in reaching the goal makes the goal-setting process futile.

One of the advantages of setting goals to improve time management is that, over time, you gain a more realistic understanding of what can be accomplished in a workday. People who do not often set goals may not be aware of what their capabilities are; however, those who have set goals more consistently have a good idea of which goals they have been able to meet and which were set too high or too low.

MEET DEADLINES EARLY

Some people thrive when working under deadlines. Newspaper reporters operate each day with a set of firm deadlines. However, many other people find deadlines to be daunting and stressful. Deadlines are set to help us manage time. By always meeting deadlines, or even by meeting them early, you can appropriately manage time. If you complete deadline work early, you reduce the stress associated with your schedule, and you have more self-confidence about completing work tasks. Additionally, a person's work is likely to be higher quality if deadlines are met; attention to detail can suffer when a person is hurrying to finish a project. To meet your deadlines early, you can break larger tasks into smaller ones and prioritize them. In addition, setting interim deadlines before a final deadline can help you to set goals and to make a large and seemingly unmanageable project seem easier to complete. Finally, tackling more difficult tasks first, as described previously, may increase your ability to meet deadlines.

STAY ORGANIZED

Organization and time management go hand in hand. Many people waste time looking for documents, messages, or other information necessary to complete tasks in a timely manner. There are a number of steps that can help you stay organized. First, arrange your workspace in a way that promotes organization. That is, have a place for everything, and put everything in its place. If you do not have a specific location for telephone messages, it is not surprising that you might spend time looking for a telephone message or even misplace one. Additionally, put the items that are most used closest to you. If you use a reference book (such as a dictionary or a computer programming language reference book) frequently, putting that book across the room wastes time. You want to minimize the amount of time you spend getting up from your desk retrieving or looking for items.

A second suggestion for staying organized is to spend a little time each day organizing your workspace. Discard paper and electronic documents that are no longer needed, file documents that will be needed at a later time, and write a to do list for tasks that must be accomplished that day or the next day. Some time management experts suggest that you only touch each piece of paper in your office once. That is, if you receive a memo, you should read it when you receive it and take action based on it only once, rather than reading the memo, putting it down, and having to reread it several times before acting on it.

A third suggestion it to use a calendar or day planner to stay organized; this will help you to remember important dates and deadlines. Without a calendar

in which such dates are noted, some tasks or meetings may be forgotten; instead of planning the time you need to do certain tasks, you may have to drop everything to accomplish a task that must be done for a meeting that you forgot was later that day. For a calendar to be effective for time management, however, you must be sure to note important dates. An incomplete or inaccurate calendar is useless. This suggestion fits nicely with the recommendation to spend a little time each day organizing your workspace. If part of your organization effort includes documenting any important dates and times and reviewing events on a calendar scheduled for the following days, this can aid time management.

FIND YOUR PRODUCTIVE TIME

Each person has a time of the day in which they are better able to concentrate or to do certain types of work. And, most people have a time of the day in which they have difficulty staying focused and getting things done. Some people are very productive in the mornings, but less able to concentrate in the afternoons. Others cannot tackle difficult tasks in the morning and prefer to wait until later in the day to do work that requires attention to detail. By determining when you are best able to do certain types of tasks, you can schedule them throughout your day so that you are most productive. For instance, if you are able to read and evaluate best in the morning, schedule those tasks for when you first arrive at work. If you find yourself getting sleepy in the afternoons, then reading quietly is not the best task for this time of day. Instead, you may choose to do tasks that involve a little bit of physical activity or that do not require as much mental concentration. Perhaps returning telephone calls or meeting with co-workers is better for afternoon tasks.

By scheduling tasks during the times of day when you are best able to do them, you are likely to be able to complete your work in a more time effective manner. Many people waste time trying to concentrate or solve difficult problems by doing so at a time that is ineffective for them. Re-reading a memo three times because you lack concentration in the late afternoon is a poor choice when you could read the memo once in the morning.

MINIMIZE STRESS

Stress is a major barrier to effective time management. Stress created by the workplace or by personal concerns can create anxiety and worry that are distracting from work. Even ineffective time management can lead to stress, since anxiety over completing tasks in a timely manner can hinder their accomplishment. To manage stress, it is important to first recognize

what is creating the stress. Is it worry over a particular task, a work situation, or an issue at home? Once the stressor is recognized, it can be better managed. If the source of stress is unidentified, then it cannot be managed.

Once the source of stress is identified, you must determine which parts of the situation can be controlled and which cannot. For instance, if the source of stress is a looming deadline for a project, tackling some elements of that project or scheduling some of the tasks may relieve stress. However, there may be parts of the project that are causing stress that cannot be managed. For instance, if part of the successful completion of the project depends on the work of another person, this may create stress that cannot be controlled unless you have some ability to monitor the work of the other person. For stressors that are out of your control, you must either find ways to exert more control or to ignore the issue and focus on those tasks that you can control.

Even when stressors have been identified and controlled to some extent, you may still experience stress. To reduce stress physically, you can get an appropriate amount of sleep, exercise regularly, and eat properly. Many Americans are sleep deprived, and skipping even a couple of hours of sleep each night can have noticeable consequences in the workplace. Some sleep experts liken working while sleep deprived to working while drunk. Although many people think that they will get more done by working more hours and sleeping less, getting appropriate amounts of sleep can instead make a person more productive during their working hours, requiring less time on the job. There are many suggestions for improving sleep, as detailed in Exhibit 1.

Exhibit 1 Tips for Improving Sleep

- **Create an environment in a bedroom that reduces distractions; don't do work or watch TV in the bedroom**
- **Make your bedroom as dark and as quiet as possible**
- **Go to bed and wake up at the same times every day**
- **Avoid caffeine late in the day**
- **Relax before bedtime by taking a warm bath or listening to soothing music**
- **Reduce worry at bedtime by writing a list of things to do the next day before going to bed**
- **If you are in bed but cannot sleep, get up and do something boring until you are sleepy**

Physical exercise can also reduce stress. Sports and other fitness activities can reduce a person's resting heart rate and blood pressure, which can help to

alleviate the negative effects of stress. Many people forgo physical activity, believing that time invested in exercise will detract from a person's ability to complete other tasks. However, much like getting proper sleep, even minimal physical activity can make a person more effective during working hours due to decreased stress and anxiety.

LEARN TO SAY NO

Many people who struggle with time management do so because they have too many obligations. People agree to take on tasks or responsibilities, knowing that their time is limited, but feeling that they cannot say no. However, people agree to take on tasks that they have little time for because they want to help others, they feel guilty for saying no, feel obligated by a superior, or misjudge the time they have available. Saying yes to people who make requests can feel good, but not having time to accomplish tasks can be a letdown to the person and the organization. So, often times, saying no to a request is a better option than taking on a task for which there is not adequate time. Therefore, knowing the right time to decline a request is important.

How does a person know when to say yes or no to a request? First, you must consider what the actual commitment is; that is, how much time, effort, and energy it will take. If you do not fully explore the possible commitments required by a certain request, you may be agreeing to do something that takes much longer than you originally anticipated. Second, you must decide if agreeing to the request is a good use of your time. If you compare the proposed commitment to your normal duties, which is more important? Those tasks that have very meaningful outcomes may be worth agreeing to do even when time is limited.

Even when a person knows that they do not have the time available to say yes to a new commitment, saying no can be difficult. To decline a request more effectively, you should do four things. First, offer the person a reason for your answer of no. If you do not provide a good reason to decline the request, then others may assume that you are lazy or selfish. Second, be tactful when you turn someone down because the denial may make him or her angry or hurt. Third, suggest an alternative that takes less time. By giving the requester another option, such as a different employee who might do the task or another time when you can help, you show that you want to cooperate, while still protecting your time. Finally, tell the person "no" as soon as possible. By asking for time to think over a decision when you know that you will decline their request, you may cause more problems or even find yourself obligated to say yes.

REDUCE THE INTRUSION OF TECHNOLOGY

The availability of communication technology, such as e-mail and cellular telephones has done much to improve the ability of Americans to get work done. However, communication technology can also hinder your ability to get work done. Employees now have many interruptions while trying to get work done. If you find that the arrival of a new email message or the ringing of the telephone is interrupting your work, you may choose to ignore them. If you are able to postpone speaking with people or responding to email messages, it may be helpful to set aside a time period that is communication free. For instance, you might decide that from 1–3 p.m. each day, you must concentrate on getting specific tasks done, and during that time, you will not take calls or read e-mails. It is important, however, after this period of no communication to respond to work-related messages received during this time period.

ORGANIZATIONAL APPROACHES TO IMPROVING TIME MANAGEMENT

Because time management can have an effect on employees' productivity in the workplace, some employers are now offering information and assistance for employees who want to better manage their time. Some organizations now offer time management workshops that teach skills such as those listed above. Additionally, seminars may be developed around particular models of time management, such as those presented in Steven Covey's book *The Seven Habits of Highly Effective People*.

Another approach employers can use to assist employees in time management skills is through wellness programs. Wellness programs are opportunities offered or subsidized by the organization to promote physical and emotional health and well-being, thereby reducing stress. They are intended as preventative measures and aim to reduce health risks and/or emotional stress. One of the outcomes that may be associated with a wellness plan is the ability to better manage time—if people are more physically well, many of the stress-related barriers to time management are reduced. Wellness plans may involve free or reduced-cost health club memberships, on-site health clubs, relaxation courses, stress-reduction courses, smoking cessation courses, and even time management courses. Some organizations even take the step of reducing health insurance premiums for those employees who participate in a wellness plan.

Finally, many organizations now offer benefits and services intended to help employees manage non-work activities. Flexible work hours, on-site day care, leave banks, and even valet services are now being offered in some organizations. These types of services,

while often improving employee recruitment and retention, may also help to reduce distractions at work, to reduce employee stress, and to assist employees in being more productive during working hours.

Time management is a challenge for many people, and there are a number of tips that can help employees to make better use of their time. By learning delegating skills, prioritizing tasks appropriately, setting goals, meeting deadlines early, staying organized, finding the most productive time of the day, minimizing stress, saying “no” to some requests, and reducing the intrusion of technology, employees may be able to improve their time management. Additionally, many organizations now offer programs to teach employees time-management skills in order to reduce stress and improve overall well-being, and to assist them in managing their non-work lives.

SEE ALSO: Goals and Goal Setting; Lean Manufacturing and Just-in-Time Production; Meeting Management; Organizing; Stress; Technology Management; Time-Based Competition

Marcia J. Simmering

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TOTAL QUALITY MANAGEMENT

SEE: Quality and Total Quality Management

TRADEMARKS

SEE: Patents and Trademarks

TRADING BLOCS

SEE: Free Trade Agreements and Trading Blocs

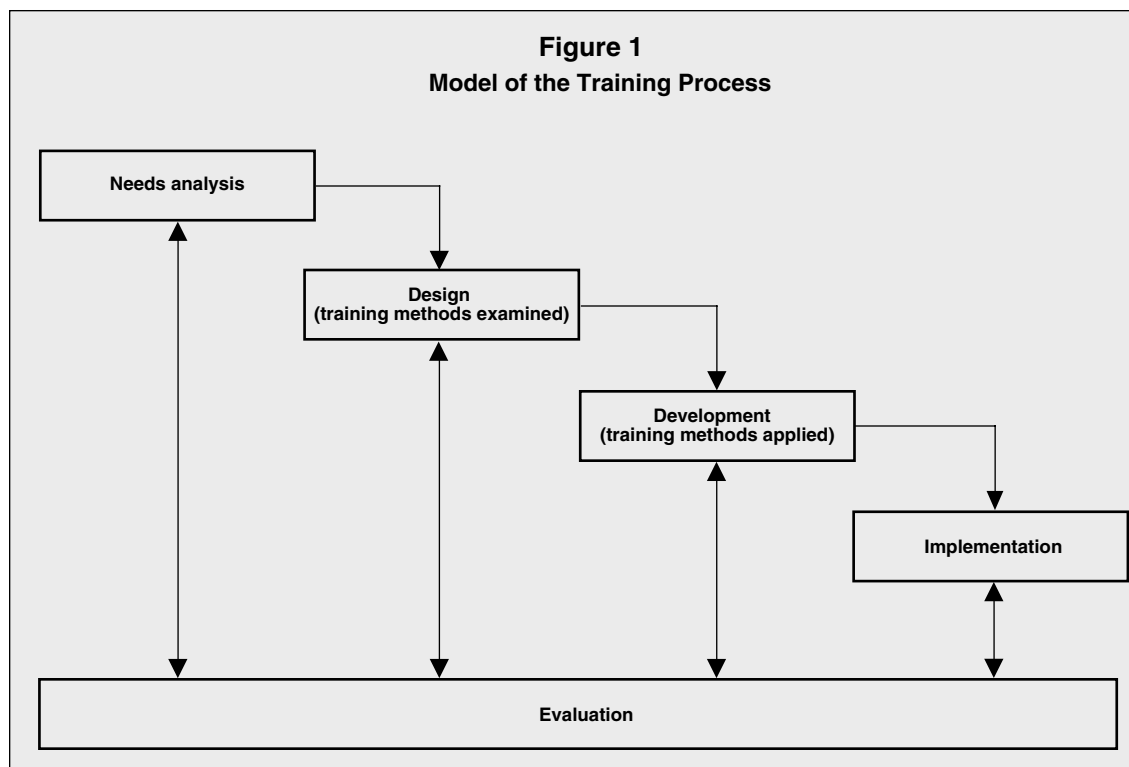
TRAINING DELIVERY METHODS

Training is a set of a systematic processes designed to meet learning objectives related to trainees’ current or future jobs. These processes can be grouped into the following phases; needs analysis, design, development, implementation, and evaluation. The phases are sequential, with the outputs of the previous phases providing the inputs to those that follow. Figure 1 depicts the phases and their relationships. Training delivery methods consist of the techniques and materials used by trainers to structure learning experiences. Different training delivery methods are better or worse at achieving various learning objectives. During the design phase (see Figure 1) the different methods are examined to determine their appropriateness for the learning objectives. Once appropriate methods have been identified, they are applied to the training plan in the development phase.

There are three categories of learning objectives: knowledge, skills, and attitudes (KSAs). Knowledge objectives are of three types: declarative, procedural, and strategic. Declarative knowledge is the person’s store of factual information. Procedural knowledge is the person’s understanding about how and when to apply the facts. Strategic knowledge is used for planning, monitoring, and revising goal-directed activity. Skill reflects one’s proficiency at specific tasks such as operating a piece of equipment, giving a presentation, or making a business decision. Attitudes are beliefs and/or opinions about objects and events and the positive or negative affect (feelings) associated with them. Attitudes affect motivation levels, which in turn influence a person’s behavior. Most training programs have learning objectives for knowledge, skill, and attitudes; these programs need to combine several methods into an integrated whole because no single method can do everything well.

The various training delivery methods can be divided into cognitive and behavioral approaches. Cognitive methods provide information orally or in written form, demonstrate relationships among concepts, or provide the rules for how to do something. They stimulate learning through their impact on cognitive processes and are associated most closely with changes in knowledge and attitudes. The lecture, discussion, e-learning and, to some extent, case studies are cognitive methods. Though these types of methods can influence skill development, it is not their strength.

Conversely, behavioral methods allow the trainee to practice behavior in a real or simulated fashion. They stimulate learning through experience and are best at skill development and attitude change. Equipment simulators, business games, role plays, the in-basket technique, behavior modeling and, to some



extent, case studies are behavioral methods. Both behavioral and cognitive methods can be used to change attitudes, though they do so through different means. On-the-job training is a combination of many methods and is effective at developing knowledge, skills, and attitudes, but is best at the latter two.

LECTURE METHOD

The lecture is best used for creating a general understanding of a topic. Several variations in the lecture format allow it to be more or less formal and/or interactive. In the pure lecture, communication is one way—from trainer to trainees. It is an extensive oral presentation of material. A good lecture begins with an introduction that lays out the purpose, the order in which topics will be covered, and ground rules about interruptions (e.g., questions and clarification). This is followed by the main body of the lecture in which information is given. The topic areas should be logically sequenced so that the content of preceding topics prepares trainees for the following topics. The lecture should conclude with a summary of the main learning points and/or conclusions.

During the pure lecture trainees listen, observe, and perhaps take notes. It can be useful in situations in which a large number of people must be given a limited amount of information in a relatively short period; however, it is not effective for learning large amounts of material in a short time period. Thus, an effective lecture should not contain too many learning points.

Trainees will forget information in direct proportion to the amount of information provided. Because the pure lecture provides only information, its usefulness is limited; when the only training objective is to have trainees acquire specific factual information, better learning can be achieved at less cost by putting the information into text. This allows trainees to read the material at their leisure and as often as necessary to retain the material. The only added value provided by the lecture is credibility that may be attached to the lecturer or the focus and emphasis provided by trainer presentation skills. Another major benefit of the lecture is that it is interactive, and that trainees can ask questions or have the presenter change the pace of the lecture if necessary.

DISCUSSION METHOD

The discussion method uses two-way communication between the lecturer and the trainees to increase learning opportunities. This method uses a short lecture (20 minutes or less) to provide trainees with basic information. This is followed by a discussion among the trainees and between the trainees and the trainer that supports, reinforces, and expands upon the information presented in the short lecture. Verbal and non-verbal feedback from trainees allows the trainer to determine if the desired learning has occurred. If not, the trainer may need to spend more time on this area and/or present the information again, but in a different manner.

Questioning (by trainees or the trainer) and discussions enhance learning because they provide clarification and keep trainees focused on the material. Discussions allow the trainee to be actively engaged in the content of the lecture, which improves recall and use in the future. Trainee questions demonstrate the level of understanding about the content of the lecture. Trainer questions stimulate thinking about the key learning points.

The pure lecture is most useful when trainees lack declarative knowledge or have attitudes that conflict with the training objectives. The discussion method is more effective than the pure lecture for learning procedural and strategic knowledge because of the discussion and questioning components. If the training objective is skill improvement, neither the lecture or discussion method is appropriate.

Both the lecture and discussion method are useful for changing or developing attitudes, though the discussion method is more effective. The lecture, and especially the discussion, modify employee attitudes by providing new insights, facts, and understanding.

E-LEARNING

Many companies have implemented e-learning, which encompasses several different types of technology assisted training, such as distance learning, computer-based training (CBT), or web-based training (WBT). Distance learning occurs when trainers and trainees are in remote locations; typically, technology is used to broadcast a trainer's lecture to many trainees in many separate locations. Distance learning provides many of the same advantages and disadvantages as the lecture method. Distance learning can be much less expensive than paying for trainees in multiple locations to travel for a lecture, but it may reduce motivation to learn because of the remoteness of the trainer.

Computer-based training and web-based training are virtually similar. With this type of training, content is delivered through the computer, using any combination of text, video, audio, chat rooms, or interactive assessment. It can be as basic as reading text on a screen or as advanced as answering quiz questions based on a computerized video that the trainee has viewed. The difference between CBT and WBT is that, with CBT, the training program is stored on a hard-drive, a CD-ROM, or diskette. This means that it is not easy to update and may be more difficult for employees to access. Conversely, WBT is housed online through either a company's intranet or through the World Wide Web. This increases accessibility of training; employees may even be able to train from their home computers. Additionally, updates to content are quick and relatively easy. For example, if an error in the training content is found, one update on the training program housed on a server updates the content for

every trainee who accesses it after that point. For a change to be made to CBT, new CD-ROMs or diskettes would have to be produced.

E-learning is an alternative to classroom-based training, and it can provide a number of advantages. E-learning can:

- reduce trainee learning time, by allowing trainees to progress at their own pace
- reduce the cost of training, particularly by reducing costs associated with travel to a training location
- provide instructional consistency, by offering the same training content to employees worldwide
- allow trainees to learn at their own pace thereby reducing any boredom or anxiety that may occur
- provide a safe method for learning hazardous tasks with computer simulations
- increase access to training to learners in locations around the world

E-learning is effective at developing declarative and, in particular, procedural knowledge. It can be useful in developing some types of skills and for modifying attitudes. E-learning develops declarative knowledge through repeated presentation of facts, using a variety of formats and presentation styles. It can do an excellent job of describing when and how to apply knowledge to various situations. Procedural knowledge is developed by allowing trainees to practice applying the knowledge to various situations simulated by the software. This training delivery method is valuable because it can automatically document trainee's responses, interpret them, and provide appropriate practice modules to improve areas of weakness.

Using e-learning, skill development is limited by the software's ability to mimic the trainee's job environment and context. For some situations, such as training employees in the use of word processing, spread sheet, and other computer-based software, e-learning is an appropriate choice for teaching skills. Here, the tasks and situations trainees will face on the job are easily simulated by the training software. On the other hand, it is very difficult to develop CBT software that realistically simulates interaction between two or more people or a person and an object in a dynamic environment. Other methods must be utilized for these situations.

E-learning can be effective at developing or modifying attitudes. The factual relationships among objects and events, and the consequences of particular courses of action, can be portrayed in many ways with e-learning technology. How objects, events and their relationships are perceived can be altered by the visual

and textual presented in a CBT. However, since the objects and events are simulated, rather than real, the emotional or affective side of attitudes may not be activated. In addition, there is no opportunity during e-learning to discuss attitudes with others in a setting where a trainer can monitor, direct, and reinforce the discussion to support the desired attitude(s). This may be one reason many adult learners indicate a preference for e-learning to be combined with some form of instructor-based training. Trainees often prefer blended training, which is when both computer and face-to-face training are combined, and it is used by many organizations.

SIMULATIONS

Simulations are designed to mimic the processes, events, and circumstances of the trainee's job. Equipment simulators, business games, in-basket exercises, case studies, role playing, and behavior modeling, are types of simulations.

EQUIPMENT SIMULATORS. Equipment simulators are mechanical devices that incorporate the same procedures, movements and/or decision processes that trainees must use with equipment back on the job. Among those trained with this method are airline pilots, air traffic controllers, military personnel, drivers, maintenance workers, telephone operators, navigators, and engineers. To be effective the simulator and how it is used must replicate, as closely as possible, the physical and psychological (time pressures, conflicting demands, etc.) aspects of the job site. To facilitate this, the equipment operators and their supervisors should be involved in the simulation design and pre-testing. This reduces potential resistance to the training and, more importantly, increases the degree of fidelity between the simulation and the work setting.

BUSINESS GAMES. Business games attempt to reflect the way an industry, company, or functional area operates. They also reflect a set of relationships, rules, and principles derived from appropriate theory (e.g., economics, organizational behavior, etc.). Many business games represent the total organization, but some focus on the functional responsibilities of particular positions within an organization (e.g., marketing director, human resource manager). These are called *functional simulations*. Games that simulate entire companies or industries provide a far better understanding of the big picture. They allow trainees to see how their decisions and actions influence not only their immediate target but also areas that are related to that target.

Prior to starting the game trainees are given information describing a situation and the rules for playing the game. They are then asked to play the game, usually being asked to make decisions about what to do given certain information. The trainees are then provided with

feedback about the results of their decisions, and asked to make another decision. This process continues until some predefined state of the organization exists or a specified number of trials have been completed. For example, if the focus is on the financial state of a company, the game might end when the company has reached a specified profitability level or when the company must declare bankruptcy. Business games involve an element of competition, either against other players or against the game itself. In using them, the trainer must be careful to ensure that the learning points are the focus, rather than the competition.

IN-BASKET TECHNIQUE. The in-basket technique simulates the type of decisions that would typically be handled in a particular position such as a sales manager or operations manager. It affords an opportunity to assess and/or develop decision-making skills and attitudes. To begin the exercise, trainees are given a description of their role (a current or future job) and general information about the situation. Trainees are then given a packet of materials (such as requests, complaints, memos, messages, and reports) which make up the in-basket. They are asked to respond to the materials within a particular time period (usually 2 to 4 hours). When the in-basket is completed, the trainer asks the trainee to identify the processes used in responding to the information and to discuss their appropriateness. The trainer provides feedback, reinforcing appropriate decisions and processes or asking the trainee to develop alternatives. A variation is to have trainees discuss their processes in a group format moderated by the trainer. Here the trainer should attempt to get the trainees to discover what worked well, what didn't and why.

CASE STUDY. Case studies are most often used to simulate strategic decision-making situations, rather than the day-to-day decisions that occur in the in-basket. The trainee is first presented with a history of the situation in which a real or imaginary organization finds itself. The key elements and problems, as perceived by the organization's key decision makers, may also be provided. Case studies range from a few pages in length to more than a hundred. Trainees are asked to respond to a set of questions or objectives. Responses are typically, though not always, in written form. Longer cases require extensive analysis and assessment of the information for its relevance to the decisions being made. Some require the trainee to gather information beyond what was in the case. Once individuals have arrived at their solutions, they discuss the diagnoses and solutions that have been generated in small groups, large groups, or both. In large groups a trainer should facilitate and direct the discussion. The trainer must guide the trainees in examining the possible alternatives and consequences without actually stating what they are.

Written and oral responses to the case are evaluated by the trainer. The trainer should convey that there is no single right or wrong solution to the case, but many possible solutions depending on the assumptions and interpretations made by the trainees. The value of the case approach is the trainees' application of known concepts and principles and the discovery of new ones. The solutions are not as important as the appropriateness with which principles are applied and the logic with which solutions are developed.

ROLE PLAY. The role play is a simulation of a single event or situation. Trainees who are actors in the role play are provided with a general description of the situation, a description of their roles (e.g., their objectives, emotions, and concerns) and the problem they face.

Role plays differ in the amount of structure they provide to the actors. A structured role play provides trainees with a great deal of detail about the situation that has brought the characters together. It also provides in greater detail each character's attitudes, needs, opinions, and so on. Structured role plays may even provide a scripted dialog between the characters. This type of role play is used primarily to develop and practice interpersonal skills such as communication, conflict resolution, and group decision making. Spontaneous role plays are loosely constructed scenarios in which one trainee plays herself while others play people that the trainee has interacted with in the past (or will in the future). The objective of this type of role play is to develop insight into one's own behavior and its impact on others. How much structure is appropriate in the scenario will depend on the learning objectives.

Whether structured or spontaneous, role plays may also differ based on the number of trainees involved. Single, multiple, and role-rotation formats provide for more or less participation in the role play. In a single role play, one group of trainees role plays while the rest of the trainees observe. While observing, other trainees analyze the interactions and identify learning points. This provides a single focus for trainees and allows for feedback from the trainer. This approach may cause the role players to be embarrassed at being the center of attention, leading to failure to play the roles in an appropriate manner. It also has the drawback of not permitting the role players to observe others perform the roles. Having non-trainees act out the role play may eliminate these problems, but adds some cost to the training.

In a multiple role play, all trainees are formed into groups. Each group acts out the scenario simultaneously. At the conclusion, each group analyzes what happened and identifies learning points. The groups may then report a summary of their learning to the other groups, followed by a general discussion. This

allows greater learning as each group will have played the roles somewhat differently. Multiple role plays allow everyone to experience the role play in a short amount of time, but may reduce the quality of feedback. The trainer will not be able to observe all groups at once, and trainees are usually reluctant to provide constructive feedback to their peers. In addition, trainees may not have the experience or expertise to provide effective feedback. To overcome this problem, video tapes of the role plays can be used by the trainee and/or trainer for evaluation.

The role-rotation method begins as either a single or multiple role play. However, when the trainees have interacted for a period of time, the role play is stopped. Observers then discuss what has happened so far and what can be learned from it. After the discussion, the role play resumes with different trainees picking up the roles from some, or all, of the characters. Role rotation demonstrates the variety of ways the issues in the role play may be handled. Trainees who are observers are more active than in the single role play since they have already participated or know they soon will be participating. A drawback is that the progress of the role play is frequently interrupted, creating additional artificiality. Again, trainees may be inhibited from publicly critiquing the behavior of their fellow trainees.

BEHAVIOR MODELING. Behavior modeling is used primarily for skill building and almost always in combination with some other technique. Interpersonal skills, sales techniques, interviewee and interviewer behavior, and safety procedures are among the many types of skills that have been successfully learned using this method. While live models can be used, it is more typical to video tape the desired behavior for use in training. The steps in behavior modeling can be summarized as follows:

1. Define the key skill deficiencies
2. Provide a brief overview of relevant theory
3. Specify key learning points and critical behaviors to watch for
4. Have an expert model the appropriate behaviors
5. Have trainees practice the appropriate behaviors in a structured role play
6. Have the trainer and other trainees provide reinforcement for appropriate imitation of the model's behavior

Behavior modeling differs from role plays and games by providing the trainee with an example of what the desired behavior looks like prior to attempting the behavior. While this method is primarily behavioral, steps 2 and 3 reflect the cognitively oriented learning features of the technique. Feedback to the trainee is especially powerful when video is used

to record both the model's and the trainee's performance. Through split screen devices, the performance of the model and the trainee can be shown side by side. This allows the trainee to clearly see where improvements are needed.

Simulations are not good at developing declarative knowledge. Some initial level of declarative and procedural knowledge is necessary before a simulation can be used effectively. Although some knowledge development can occur in simulations, usually other methods are required for this type of learning. Simulations provide a context in which this knowledge is applied. Improving the trainees' ability to apply knowledge (i.e., facts, procedures, strategies) is the focus of simulations. Simulations do a good job of developing skills because they:

- simulate the important conditions and situations that occur on the job
- allow the trainee to practice the skill
- provide feedback about the appropriateness of their actions

Each of the different formats has particular types of skills for which they are more appropriate:

- Mechanical, machine operation, and tool-usage skills are best learned through use of equipment simulators.
- Business decision-making skills (both day to day and strategic), planning, and complex problem solving can be effectively learned through the use of business games.
- The in-basket technique is best suited to development of strategic knowledge used in making day-to-day decisions.
- Case studies are most appropriate for developing analytic skills, higher-level principles, and complex problem-solving strategies. Because trainees do not actually implement their decision/solution, its focus is more on what to do (strategic knowledge) than on how to get it done (skills).
- Role plays provide a good vehicle for developing interpersonal skills and personal insight, allowing trainees to practice interacting with others and receiving feedback. They are an especially effective technique for creating attitude change, allowing trainees to experience their feelings about their behavior and others' reactions to it.

ON-THE-JOB TRAINING

The most common method of training, on-the-job training (OJT) uses more experienced and skilled employees to train less skilled and experienced employees. OJT takes many forms and can be supple-

mented with classroom training. Included within OJT are the job-instruction technique, apprenticeships, coaching, and mentoring. Formal OJT programs are typically conducted by employees who can effectively use one-on-one instructional techniques and who have superior technical knowledge and skills. Since conducting one-on-one training is not a skill most people develop on their own, *train-the-trainer* training is required for OJT trainers. In addition to training the trainers, formal OJT programs should carefully develop a sequence of learning events for trainees. The formalized instructional process that is most commonly used is called the job-instruction technique.

JOB-INSTRUCTION TECHNIQUE (JIT). The JIT was developed during World War II and is still one of the best techniques for implementation of OJT nearly forty years later. It focuses on skill development, although there are usually some factual and procedural-knowledge objectives as well. There are four steps in the JIT process: prepare, present, try out and follow up.

Prepare. Preparation and follow up are the two areas that are most often ignored in OJT programs. Preparation should include a written breakdown of the job. Ignoring this step will prevent the trainer from seeing the job through the eyes of the trainee. When the trainer is very skilled there are many things he does on the job without thinking about them. This can result in their being overlooked in training without a systematic analysis and documentation of the job tasks prior to beginning training.

Once the tasks have been documented, the trainer must prepare an instructional plan. Here, the trainer must determine what the trainee currently knows and does not know. This is the needs analysis phase of Figure 1. Interviewing the trainee, checking personnel records and previous training completed are among the many ways of determining what KSAs the trainee currently has. This is compared to the KSAs the trainee needs to perform the tasks. The instructional plan is then completed focusing on the trainee's KSA deficiencies.

Immediately prior to the training, the trainee should be provided with an orientation to the OJT/JIT learning process. The orientation should help trainees understand their role and the role of the trainer. The importance of listening effectively and feeling comfortable asking questions should be emphasized. The trainee should become familiar with the steps in the JIT process so he or she knows what to expect and when it will occur.

Present. In this stage of JIT there are four activities: tell, show, demonstrate, and explain. When telling and showing, the trainer provides an overview of the job while showing the trainee the different aspects of

it. The trainer is not actually doing the job, but pointing out important items such as where levers are located, where materials are stored, and so on. The trainer then demonstrates how to do the job, explaining why it is done that particular way and emphasizing key learning points and important safety instructions. The components of the job should be covered one at a time, and in the order they would normally occur while performing the job.

Try Out. The trainee should be able to explain to the trainer how to do the job prior to actually trying to do the job. This provides a safe transition from watching and listening to doing. When the trainee first tries out the job the trainer should consider any errors to be a function of the training, not the trainee's learning ability. When errors are made they should be used to allow the trainee to learn what not to do and why. The trainer can facilitate this by questioning the trainee about his actions and guiding him or her in identifying the correct procedures.

Follow Up. During follow up the trainer should check the trainees' work often enough to prevent incorrect or bad work habits from developing. The trainer should also reassure the trainee that it is important to ask for help during these initial solo efforts. As trainees demonstrate proficiency in the job, progress checks can taper off until eventually they are eliminated.

APPRENTICESHIP TRAINING. Apprenticeship training dates back to the Middle Ages, when skilled craftsmen passed on their knowledge to others as a way of preserving the guilds. Today, apprenticeship programs are partnerships between labor unions, employers, schools, and the government. They are most often found in the skilled trades and professional unions such as boiler engineers, electrical workers, pipe fitters, and carpenters. The typical apprenticeship program requires two years of on-the-job experience and about 180 hours of classroom instruction, though requirements vary. An apprentice must be able to demonstrate mastery of all required skills and knowledge before being allowed to graduate to journeyman status. This is documented through testing and certification processes. Journeymen provide the on-the-job training, while adult education centers and community colleges typically provide the classroom training. Formal apprenticeship programs are regulated by governmental agencies that also set standards and provide services.

COACHING. Coaching is a process of providing one-on-one guidance and instruction to improve the work performance of the person being coached in a specific area. It differs from other OJT methods in that the trainee already has been working at the job for some time. Usually, coaching is directed at employees with performance deficiencies, but it can also serve as a motivational tool for those performing adequately.

Typically the supervisor acts as the coach. Like the OJT trainer, the coach must be skilled both in how to perform the task(s) and how to train others to do them. The amount of time supervisors devote to coaching activities steadily increased during the 1990s and will likely represent more than 50 percent of supervisors' time by the new millennium.

The coaching process, viewed from the coach's perspective, generally follows the outline below. Note the similarities between JIT and this process.

1. Understand the trainee's job, the KSAs and resources required to meet performance expectations, and the trainee's current level of performance.
2. Meet with the trainee and mutually agree on the performance objectives to be achieved.
3. Mutually arrive at a plan/schedule for achieving the performance objectives.
4. At the work site, show the trainee how to achieve the objectives, observe the trainee's performance, then provide feedback.
5. Repeat step 4 until performance improves.

MENTORING. pararing is a form of coaching in which an ongoing relationship is developed between a senior and junior employee. This technique focuses on providing the junior employee with political guidance and a clear understanding of how the organization goes about its business. Mentoring is more concerned with improving the employee's fit within the organization than improving technical aspects of performance, thus differentiating it from coaching. Generally, though not always, mentors are only provided for management-level employees.

SEE ALSO: Case Method of Analysis; Continuing Education and Lifelong Learning Trends; Employee Screening and Selection; Management and Executive Development; Mentoring

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TRANSNATIONAL ORGANIZATION

Organizations competing on an international basis face choices in terms of resource allocation, the balance of authority between the central office and business units, and the degree to which products and services are customized in order to accommodate tastes and preferences of local markets. When employing a transnational strategy, the goal is to combine elements of global and multidomestic strategies. Each of these will now be briefly discussed.

A global strategy involves a high degree of concentration of resources and capabilities in the central office and centralization of authority in order to exploit potential scale and learning economies. Customization at the local level is thus necessarily low. The multidomestic strategy, on the other hand, represents the opposite view of international strategy. Resources are dispersed throughout the various countries where the firm does business, decision-making authority is pushed down to the local level, and each business unit is allowed to customize product and market offerings to specific needs. The corporation as a whole foregoes the benefits that could be derived from centralization and coordination of diverse activities.

A transnational strategy allows for the attainment of benefits inherent in both global and multidomestic strategies. The overseas components are integrated into the overall corporate structure across several dimensions, and each of the components is empowered to become a source of specialized innovation. It is a management approach in which an organization integrates its global business activities through close cooperation and interdependence among its headquarters, operations, and international subsidiaries, and its use of appropriate global information technologies (Zwass, 1998).

The key philosophy of a transnational organization is adaptation to all environmental situations and achieving flexibility by capitalizing on knowledge flows (which take the form of decisions and value-added information) and two-way communication throughout the organization. The principal character-

istic of a transnational strategy is the differentiated contributions by all its units to integrated worldwide operations. As one of its other characteristics, a joint innovation by headquarters and by some of the overseas units leads to the development of relatively standardized and yet flexible products and services that can capture several local markets. Decision making and knowledge generation are distributed among the units of a transnational organization.

Structure follows strategy (Chandler, 1962), implying that a transnational strategy must have an appropriate structure in order to implement the strategy. Just as the transnational strategy is a combination or hybrid strategy between global and multidomestic strategies, the organizational structure of firms pursuing transnational strategies is a structure that draws on characteristics of the worldwide geographic structure and the worldwide product divisional structure. The combination of mechanisms needed is somewhat contradictory, because the structure need be centralized and decentralized, integrated and nonintegrated, and formalized and nonformalized. But firms that can successfully implement this strategy and structure often perform better than firms pursuing only multidomestic or global strategies.

Transnational companies often enter into strategic alliances with their customers, suppliers, and other business partners to save time and capital. As long-term partnerships, these alliances may bring to the firm specialized competencies, relatively stable and sophisticated market outlets that help in honing its products and services, or stable and flexible supply sources. This may result in a virtual corporation, consisting of several independent firms that collaborate to bring products or services to the market.

A transnational model represents a compromise between local autonomy and centralized decision making. The organization seeks a balance between the pressures for global integration and the pressures for local responsiveness. It achieves this balance by pursuing a distributed strategy which is a hybrid of the centralized and decentralized strategies. Under the transnational model, a multinational corporation's assets and capabilities are dispersed according to the most beneficial location for a specific activity. Simultaneously, overseas operations are interdependent, and knowledge is developed jointly and shared worldwide.

Transnational firms have higher degrees of coordination with low control dispersed throughout the organization. The five implementation tactics (Vitalari and Wetherbe, 1996) used for implementing the transnational model are:

- mass customization-synergies through global research and development (e.g., American Express, Time Warner, Frito-Lay, MCI)

- global sourcing and logistics (e.g., Benetton, Citicorp)
- global intelligence and information resources (e.g., Andersen Consulting, McKinsey Consulting)
- global customer service (e.g., American Express)
- global alliances (e.g., British Airways and US Air; KLM and Northwest)

STUDIES

In a study of SBUs in large U.S.-based multinational firms, Wasilewski (2002) reported positive associations between transnational marketing strategies and performance. Improvements apparently resulted both from efficiencies gained from global integration and flexibility inherent in national responsiveness.

King and Sethi (1999) define a comprehensive taxonomy of transnational strategy with five important dimensions of transnational strategy: the configuration of value-chain activities, which refers to the geographic dispersal of a firm's value-chain components; the coordination of value-chain activities; centralization; strategic alliances; and market integration, which refers to the extent to which the parent corporation views the international market as a single competitive arena.

Asea Brown Boveri (ABB) is an example of a successful transnational management model implementation. ABB, with home bases in Sweden and Switzerland, exemplifies the trend towards cross-national mergers that lead firms to consider multiple headquarters in the future. It is managed as a flexible network of units, and one of management's main functions is the facilitation of information/knowledge flows between units. ABB's subsidiaries have full responsibility for product categories on a worldwide basis. Operating transnationally brings the benefits of access to new markets and the opportunity to utilize and develop resources wherever they may be located.

Nestlé CEO Peter Brabeck recently questioned the idea of a so-called global consumer. The firm appears to be successfully implementing a transnational strategy by making centralization decisions based partly on whether value-chain activities are upstream or downstream. According to Brabeck: "The closer we come to the consumer, in branding, pricing, communication, and product adaptation, the more we decentralize. The more we are dealing with production, logistics, and supply-chain management, the more centralized decision making becomes. After all, we want to leverage Nestlé's size, not be hampered by it" (Wetlaufer, 2001).

SEE ALSO: International Business; International Management; International Management; Organizational Structure

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TRANSPORTATION

SEE: Logistics and Transportation

TRENDS IN ORGANIZATIONAL CHANGE

Organizations have entered a new era characterized by rapid, dramatic and turbulent changes. The accelerated pace of change has transformed how work is performed by employees in diverse organizations. Change has truly become an inherent and integral part of organizational life.

Several emerging trends are impacting organizational life. Of these emerging trends, five will be examined: globalization, diversity, flexibility, flat, and networks. These five emerging trends create tensions for organizational leaders and employees as they go through waves of changes in their organizations. These tensions present opportunities as well as threats, and if these tensions are not managed well, they will result in dysfunctional and dire organizational outcomes at the end of any change process. These five trends and the specific tensions they produce are presented in Table 1.

GLOBALIZATION

Organizations operate in a global economy that is characterized by greater and more intense competition, and at the same time, greater economic interdependence and collaboration. More products and services are being consumed outside of their country of origin than ever before as globalization brings about greater convergence in terms of consumer tastes and preferences. Yet at the same time, in the midst of greater convergence, there is the opposite force of divergence at work where companies have to adapt corporate and business strategies, marketing plans, and production efforts to local domestic markets.

To stay competitive, more organizations are embracing offshore outsourcing. Many functions are being shifted to India, the Philippines, Malaysia, and other countries for their low labor costs, high levels of workforce education, and technological advantages. According to the 2002-2003 Society for Human

Resource Management (SHRM) Workplace Forecast, companies such as Ford, General Motors, and Nestle employ more people outside of their headquarters countries than within those countries.

Almost any company, whether in manufacturing or services, can find some part of its work that can be done off site. Forrester Research projects that 3.3 million U.S. service- and knowledge-based jobs will be shipped overseas by the year 2015, 70 percent of which will move to India. Communication and information sharing are occurring across the globe in multiple languages and multiple cultures. Global competition and global cooperation coexist in the new world economy.

One major consequence of globalization is greater mobility in international capital and labor markets. This creates a global marketplace where there is more opportunity, because there are more potential customers. However, there is also more competition, as local companies have to compete with foreign companies for customers.

According to Dani Rodrik, professor of international political economy at Harvard's Kennedy School of Government, the processes associated with the global integration of markets for goods, services, and capital have created two sources of tensions.

First, reduced barriers to trade and investment accentuate the asymmetries between groups that can cross international borders, and those that cannot. In the first category are owners of capital, highly skilled workers, and many professionals. Unskilled and semi-skilled workers and most middle managers belong in the second category.

Second, globalization engenders conflicts within and between nations over domestic norms and the social institutions that embody them. As the technology for manufactured goods becomes standardized and diffused internationally, nations with very different sets of values, norms, institutions, and collective preferences begin to compete head on in markets for similar goods. Trade becomes contentious when it unleashes forces that undermine the norms implicit in local or domestic workplace practices.

Table 1
Change-Trends and Tensions in Organizations

Trends	Tensions
1. Globalization	Global versus Local
2. Diversity	Heterogeneity versus Homogeneity
3. Flexibility	Flexibility versus Stability
4. Flat	Centralization versus Decentralization
5. Networks	Interdependence versus Independence

Professor Rodrik concluded that “the most serious challenge for the world economy in the years ahead lies in making globalization compatible with domestic social and political stability” (Rodrik 1997, p. 2). This implies ensuring that international economic integration does not lead to domestic social disintegration. Organizations that are confronted with this challenge will have to manage the tension created by the global integration versus local disintegration dilemma.

The overall picture as a consequence of globalization is one of turbulence and uncertainty, in which a variety of contradictory processes present a wide range of both opportunities and threats that defy established ways of doing business and working in organizations. Integration and exclusion coexist uneasily side-by-side in organizations.

For example, many apparent dichotomies or paradoxes—competition versus collaboration, market forces versus state intervention, global actions versus local solutions—are losing their sharp edges as contradictory forces appear to converge and reinforce each other in organizations across the globe. Companies that compete fiercely in some markets form strategic alliances in others; government guidance and regulation are required to make markets work effectively; and “think globally, act locally” has been adopted as business strategy (or as a mantra) to deal with the challenges of doing business in the globalized economy. As organizations transform themselves to stay competitive, they will need to confront and resolve some, if not all, of these dichotomies or paradoxes.

On another level, because of globalization, the fates of people living and working in different parts of the world are becoming intertwined. Global events may have significant local impact. September 11, 2001 has been called the “day that changed the world”. Heightened security concerns are changing expectations for people in organizations, and the role of organizations themselves. The threat of terrorism continues to be an ongoing concern worldwide. It has created a renewed focus on workplace security as employees experience a heightened sense of vulnerability in the workplace. Employee monitoring and screening are occurring more frequently. Concern over travel for business purposes is resulting in the increased use of alternate forms of communication such as teleconferencing and videoconferencing.

DIVERSITY

Globalization is impacting how organizations compete with each other. In combination with changing demographics, globalization is causing a rapid increase in diversity in organizations. Never before have people been required to work together with

colleagues and customers from so many different cultures and countries.

Diversity is moving American society away from “mass society” to “mosaic society”. Organizations reflect this “mosaic society” in their more diverse workforce (in terms of not only race, ethnic or culture but also in terms of age, sexual orientation, and other demographic variables). More than ever, people have to interact and communicate with others who come from diverse backgrounds. This in turn has meant that employees need new relational skills to succeed. An emerging stream of research in international management has called these new relational skills “cultural intelligence”. Cultural intelligence is defined as the capability to adapt effectively across different national, organizational and professional cultures (Earley, Ang and Tan, 2005). More managers take up global work assignments in industries around the world. They learn how to work with people who not only think and communicate differently but also do things differently. Managers will need to develop their cultural intelligence to manage greater diversity in organizations.

Diversity in organizations will continue to increase. As indicated by the U.S Census Bureau National Population Projections, the Hispanic population will increase by 11.2 percent between 2000 and 2025 to become the largest minority group in the United States. All other minority groups will increase by about 9 percent, while the number of Caucasians will decrease by approximately 19 percent. The world population is growing at a high rate in developing countries, while remaining stable or decreasing in the developed world. The result will be income inequities and economic opportunity leading to increased immigration and migration within and between nations. More temporary workers will be used for specific tasks, and there will be a greater demand for highly skilled workers.

The aging American workforce population means more retirees and potential gaps in availability of experienced workers. According to American Association of Retired Persons (AARP), by 2015 nearly one in five U.S. workers will be age 55 or older. Retirees often want to keep a foot in the workplace. AARP’s research shows that nearly 8 of 10 baby boomers envision working part time after retirement; 5 percent anticipate working full time at a new job or career; only 16 percent foresee not working at all.

People of different ethnic and cultural backgrounds possess different attitudes, values, and norms. Increasing cultural diversity in both public and private sector organizations focuses attention on the distinctions between ethnic and cultural groups in their attitudes and performance at work. This greater focus can result in the tension between finding similarities and accentuating differences in the face of greater diversity in organizations.

There is an on-going debate between the *heterogenists* and the *homogenists* concerning the impact of greater diversity in organizations. The *heterogenists* contend that diverse or heterogeneous groups in organizations have performance advantages over homogeneous groups while the *homogenists* take the opposing view—that homogeneous groups are more advantageous than heterogeneous or diverse groups in organizations.

According to the *heterogenists*, organizations with greater diversity have an advantage in attracting and retaining the best available human talent. The exceptional capabilities of women and minorities offer a rich labor pool for organizations to tap. When organizations attract, retain, and promote maximum utilization of people from diverse cultural backgrounds, they gain competitive advantage and sustain the highest quality of human resources.

Organizations with greater diversity can understand and penetrate wider and enhanced markets. Not only do these organizations embrace a diverse workforce internally, they are better suited to serve a diverse external clientele. Organizations with greater diversity also display higher creativity and innovation. Especially in research-oriented and high technology organizations, the array of talents provided by a gender- and ethnic-diverse organization becomes invaluable. Heterogeneous or diverse groups display better problem solving ability as they are more capable of avoiding the consequences of *groupthink*, compared to highly cohesive and homogeneous groups that are more susceptible to conformity.

On the other hand, greater organizational diversity has its drawbacks. With the benefits of diversity come organizational costs. Too much diversity can lead to dysfunctional outcomes. Diversity increases ambiguity, complexity, and confusion. Organizations with greater diversity may have difficulty reaching consensus and implementing solutions. In many organizations, diversity can produce negative dynamics such as ethnocentrism, stereotyping and cultural clashes.

The *homogenists* argue that homogeneous groups often outperform culturally diverse groups, especially where there is a serious communication problem. Cross-cultural training is necessary to enable culturally diverse groups to live up to their potential and overcome communication difficulties. The diversity movement, according to the *homogenists*, has the potential to polarize different social groups and harm productivity while breeding cynicism and resentment, heightening intergroup frictions and tensions, and lowering productivity, just the opposite of what managing diversity is intended to accomplish.

The challenge therefore is for management to manage the tension produced by heterogeneity versus

homogeneity. If properly managed, organizations can reap the benefits of greater diversity. Aside from proper management, organizations need to learn to appreciate and value diversity before the benefits of diversity can be fully realized. To achieve this, diversity training programs may help people in organizations understand and value diversity.

FLEXIBILITY

Globalization and diversity trends are forcing organizations to become more flexible and adaptable. To be able to function globally and to embrace diversity, leaders and employees in organizations have to become more flexible and develop a wider repertoire of skills and strategies in working with diverse groups of people in the workplace as well as in the marketplace.

The response to increased diversity has, in many cases, been increased organizational flexibility. Some organizations allow workers to have very different work arrangements (e.g. flex-time) and payment schedules. Some organizations (and workers) have found it convenient to treat some workers as independent consultants rather than employees. In certain occupations, advances in communication and information technologies have enabled *telecommuting*—working at home via computer. One consequence of this is the blurring of boundaries between work and home, and where and when work occurs. The benefits of greater flexibility may be countered by the negative consequences of working 24/7 including higher stress and burnout.

The response to increased competition, however, has resulted in a tension generated by the demands to be flexible and yet maintain some stability as changes are implemented in organizations. To stay competitive, organizations are constantly changing and restructuring to increase flexibility and decrease costs. Business process reengineering, business process outsourcing, job redesign, and other approaches to optimize business processes have been implemented to increase operational and process efficiency while reducing the costs of doing business.

Changes in business and operational processes need time to stabilize for employees to learn the new processes, become familiar with them, and be able to operate effectively and efficiently. Yet, competitive pressures can cause organizations to go through a series of changes without giving employees adequate time for learning and training, and for the benefits of the change to be fully realized in the organization. This tension is well-captured by Columbia Business School professor Eric Abrahamson in his book, *Change Without Pain* (2004) in which he discussed how organizations can go through change overload and how employees can experience change fatigue

and burnout. Professor Abrahamson proposes “creative recombination” as an alternative approach to the highly destructive, destabilizing and painful changes caused by “creative destruction”.

FLAT

In a greater competitive marketplace, speed or response time is critical. How organizations respond to customers and other stakeholders or be the first to market may make a significant difference as time is at a premium. Organizations that can develop new technologies faster or can adapt to changes in the market faster are the ones that will survive the competition. To maximize response time, organizations have been flattening their hierarchies and structures, in addition to other initiatives such as downsizing and networking. Flat organizations make decisions more quickly because each person is closer to the ultimate decision-makers. There are fewer levels of management, and workers are empowered to make decisions. Decision-making becomes decentralized.

However, flat organizations create a new tension between decentralization and centralization. Among the drivers of decentralization are communications technologies that allow companies to push decision-making away from the core. Proponents of decentralization emphasize the idea that less hierarchical organizations mirror the efficiencies of the networks that enable them: they are faster, more resilient, more responsive, more flexible and more innovative. Also, they argue, people who work within decentralized organizations feel empowered and energized. They do not need to focus on the chain of command and they do not feel constrained by it.

Organizations are caught between the opposing forces of centralization and decentralization. They want to leverage the opportunities offered by decentralization and create more nimble and forceful organizations, but they cannot always do so because the forces of centralization come into play. There are obvious benefits to centralization as control is comparatively tighter and accountability is clearer compared to a flatter, more decentralized organizational structure.

Take the example of IT operations. The key to a centralized organization’s success is its responsiveness. If the centralized operation can be responsive to the needs of the business, then that approach can make sense. Several companies, such as DaimlerChrysler and PepsiCo, have migrated back to centralizing IT operations after attempts at decentralization.

The debate over the centralization versus decentralization of operations in organizations is an enduring one. It is an age-old battle of standardization versus autonomy, corporate efficiency versus local effectiveness and pressure on costs and resources versus accommodation of specific local needs.

Vacillation between centralization and decentralization is both non-productive and unnecessary. Organizations, as they desire to become flatter, will need to be clear about how they need to respond to the tension between centralization and decentralization.

NETWORKS

Organizations that flatten tend to encourage horizontal communication among workers. Rather than working through the organizational hierarchy, it is often faster for workers who need to coordinate with each other simply to communicate directly. Such organizations are highly networked.

Another meaning of networked organizations refers to their relations to other organizations. Organizations that have downsized to just their core competencies must then outsource all the functions that used to be done inhouse. To avoid losing time and effort managing contracts with suppliers, organizations have learned to develop close ties to their suppliers so that social mechanisms of coordination replace legal mechanisms, which are slow and costly. In many industries, such as the garment industry in Italy, strong relationships have developed between manufacturers and suppliers (and other manufacturers), so that considerable work is done without a contract and without even working out a firm price. For these networked organizations to work, high trust and social capital between organizations are key elements.

Networked organizations are particularly important in industries with complex products where technologies and customer needs change rapidly, such as in high technology industries. Close ties among a set of companies enables them to work with each other in ways that are faster than arms-length contracts would permit, and yet retains the flexibility of being able to drop the relationship if needed (as opposed to performing the function in-house). The trend towards networked organizations and structures create a new tension between interdependence and independence. The forces of aggregation and disaggregation throw up new challenges for organizations, for example, the use of independent contractors, joint ventures, strategic partnerships and alliances even with competitors.

One advantage of networks is that organizations have greater flexibility and thus they can become more competitive in the global marketplace. Another advantage is that organizations do not require that many resources such as employee benefits, office space, and financing for new business ventures.

On the other hand, networks have distinct disadvantages. Organizations may find it more difficult to control quality of goods or services as they now have to depend on their partners in the networks to deliver the quality that is desired. Legal and contracting

expertise as well as negotiation expertise will also be important for networks. Alternative forms of control may need to be developed to control quality. Alternative mechanisms for coordination may also need to be developed to manage the growing constellation and sometimes tenuous nature of other partner organizations in the network.

All the five trends and the tensions they produce result in greater organizational or system complexity for both leaders and employees in organizations. The tensions produced by these trends cannot be solved. They have to be managed. Effective approaches in organizational change will involve not one strategy but many alternatives and will require leaders and employees to develop greater resilience in confronting these tensions.

SEE ALSO: Diversity; Globalization

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