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WAREHOUSING AND WAREHOUSE MANAGEMENT

Warehousing is the storage of goods for profit. The physical location, the warehouse, is a storage facility that receives goods and products for the eventual distribution to consumers or other businesses. A warehouse is also called a distribution center. Warehouse management is the process of coordinating the incoming goods, the subsequent storage and tracking of the goods, and finally, the distribution of the goods to their proper destinations.

HISTORY

Warehousing's roots go back to the creation of granaries to store food, which was historically available for purchase during times of famine. As European explorers began to create shipping-trade routes with other nations, warehouses grew in importance for the storage of products and commodities from afar. Ports were the major location for warehouses.

As railroads began to expand travel and transportation, the creation of rail depots for the storage of materials became necessary. In 1891 the American Warehousemen's Association was organized to challenge the railroad companies' control over freight depots. President Theodore Roosevelt significantly strengthened the Interstate Commerce Commission with passage of the Hepburn Act in 1906. Commercial warehousing began to grow after the government placed more restrictions on railroads.

World War II impacted warehousing in several ways, including the need to increase the size of warehouses and the need for more mechanized methods of storing and retrieving the products and materials. As mass production grew throughout manufacturing, the needs of efficient and effective warehousing capabilities grew with it.

MODERN ISSUES

The warehouse industry found itself recovering from a recession at the start of the twenty-first century, partially brought on by the hype of the dot-com bubble and the excess production created after it burst. It also coped with new methods of distribution, such as just-in-time (JIT) manufacturing—where warehousing is unnecessary because products are shipped directly to customers.

Warehousing companies are now striving to become more than simply storage facilities. They are transforming themselves into "third-party logistics providers" or "3PLs" that provide a wide array of services and functions. In addition to packing and staging pallets, contemporary warehousing facilities offer light manufacturing, call centers, labeling, and other non-storage options.

WAREHOUSE FUNCTIONS

Warehousing is a key component of the overall business supply chain. The supply chain consists of the facilities and distribution options for the procurement of materials from manufacturer to customer and all points in between. It includes the production of materials into components and finished products and then the distribution to customers.

Warehouse functions include:

- the storage of goods to permit managing product flow or to accommodate longer production runs;

Growth of Warehousing 1997–2002
Warehousing and Storage

	Establishments	Revenue	Annual Payroll($,000)	Paid employees
1997	6,497	10,657,925	2,926,119	109,760
2002	12,637	17,924,787	18,689,122	639,174

Source: U.S. Department of Commerce: Department of the Census: Economic Census

- serving as a mixing point where products from different suppliers are mixed and then distributed to fulfill customer orders;
- a sales branch and customer service location;
- a source of supplies for production;
- a staging area for final packaging or finishing.

WAREHOUSE OPERATIONS

Warehouses are operated in several ways. Public warehousing involves the client paying a standard fee for the storage of merchandise. Private warehousing is storage and operations controlled completely by a single manufacturer. Leased warehousing is an option for more stable inventory. Contract warehousing clients pay fees regardless of whether they are using the space or not; the space is always there for them to use, however. According to *Overview of Warehousing in North America,* contract warehousing accounts for more than 60 percent of the U.S. commercial market.

A warehouse stands empty without some form of product. Delivery of goods and materials takes place either by truck, rail, or boat on a dock or loading area. The goods are received, processed, and then sent into the warehouse for storage.

The storage of goods has been the primary function for warehouses. Once the goods have been received from the manufacturer and/or shipper, they are compactly stored to maximize space within the facility. Products are placed on pallets, which allow for more consistent stacking and moving within the facility.

Contract and public warehouses receive goods and products from a multitude of manufacturers and shippers. A crucial aspect of warehouse management is inventory control. Inventory control is the ability to locate and track a given product within the warehouse to facilitate quick selection and loading for order fulfillment. It is also the process of maintaining sufficient amounts of product to meet customer demands, while at the same time balancing the expense of keeping product in storage. Perpetual, annual, physical, and cycle counting are all methods of keeping track of inventory.

Order picking is the process of selecting products to fulfill an order. There are several types of picking methods:

- Discrete or pick-by-order: Specific products are selected on a per order basis.
- Batch or pick-by-article: Multiples of a product are selected to fulfill multiple orders. The products are sorted in the staging area and combined with other products to fulfill the orders.
- Wave: Involves gathering products based on specific routing or shipping criteria.
- Reverse-order: Used when part of an order is held to be combined with another order.

Reverse-order picking is related to cross-docking, another function of warehouses. Cross-docking is a direct flow of goods from receiving to shipping, with little if any storage. Cross-docking is contingent on the timely delivery of products, accurate management on the loading dock, and effective ordering by the customer.

Warehousing is also involved in the packaging and labeling of a product as it moves through the facility. Proper packaging is necessary for effective storage and to guard against damage. Labeling, or tagging, is an important element of the packaging. Proper labeling improves the ability to identify, track, store, and select the correct product for order fulfillment.

Once the product has been selected, or picked, it is brought to a staging area for final processing and shipment. The loading dock is a hub of activity as products are arriving for storage and being staged for distribution. Effective management of this area is crucial for warehouse success. It is here that cross-docking takes place.

The final stage of warehousing is the transportation facet of delivering and shipping goods.

WAREHOUSE MANAGEMENT

In the past warehouse management was very paper-intensive in its coordination of a multitude of

activities. This has changed with the introduction of warehouse management system software.

Warehouse management systems (WMS) assist managers in tracking products throughout the entire storage and distribution process. These systems span from simple computer automation systems to high-end, feature-rich management programs that improve order picking, facilitate better dock logistics, and monitor inventory management.

TRENDS

According to a *Warehousing Management* survey, competition in warehousing has become extremely tight because businesses seek warehouse firms with extremely thin margins. Companies are succeeding by remaining flexible and investing in technology. The main issues or trends in warehousing include radio frequency identification (RFID), transportation management systems, pick-to-light technology, and voice-activated receiving and packaging.

Voice-activated receiving and packaging allows for warehouse personnel to speak requests into the WMS, thus speeding the entire process. Transportation management systems provide an advanced level of detail on goods prior to their arrival and also provide a more specific time of delivery. RFID has dramatically improved the ability to effectively manage inventory and track the location of specific goods within the warehouse. Pick-to-light technology improves order picking along warehouse conveyor belts by monitoring and identifying products for specific shipments.

A significant trend is the continuing growth of 3PL providers as companies try to cut costs and management issues by outsourcing their warehouse and distribution functions. An outcome of increased 3PL activity is a wave of mergers that are consolidating the industry. Customer demands for one-stop shopping and new technologies are a driving force behind this consolidation.

Warehousing is a mature industry seeking methods to maximize profits and striving to add services to compete for customers. The warehousing industry is a key component of the supply chain and will likely remain so as long as there are manufacturers and consumers.

SEE ALSO: Location Strategy; Logistics and Transportation; Supply Chain Management

Hal P. Kirkwood, Jr.

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WOMEN AND MINORITIES IN MANAGEMENT

The role of women and minorities in the twenty-first century American work place continues to develop.

For centuries, women have served their families—preparing food, making clothes, and performing other functions—to make homes for their husbands and children. As times changed and economic opportunities moved from the farms to the factories, the roles of women began to evolve. Instead of staying home and producing goods for the family, women began looking for jobs outside the home. While many women worked in traditionally "female" occupations such as teaching and nursing, many women began working in factories or low-paying clerical and labor jobs. The industrial revolution forever changed the way the American economy operated, and with that change, more women chose to work and supplement family income.

Additionally, the demographic mix within the twenty-first century workplace has become much more diverse because many workers now entering the workforce are neither white, male, nor English speaking. People of color continue to increase their share of the labor force. The rates of growth for these groups are projected to be faster than the rate for whites.

WOMEN AND MINORITIES IN THE LABOR FORCE

WOMEN. In 1950 only about one in three women participated in the labor force. By 1998, approximately three out of every five women of working age were in the labor force. By 2003, close to 60 percent of all women aged sixteen and older were in the labor force. The U.S. Department of Labor projects this figure will continue to increase at a slower rate reaching and is projected to reach nearly 63 percent by the year 2015.

At the beginning of the twentieth century, women made up less than 20 percent of the United State labor force. By 1950, this percentage increased to 33.9 percent. By the year 2000, women comprised more than 46 percent of the civilian labor force. Therefore, within the roughly the past fifty years the number of women in the American workforce has multiplied by more than 240 percent. As of February 2005, there were almost 67 million women employed in the civilian labor force. The U.S. Department of Labor estimates that women over the age of twenty participated in the workforce at a rate of 62 percent in 2004. Furthermore, the increase of women participating in the workforce will cover many racial groups, with women of color enjoying the fastest growth rate.

Interestingly, however, the rate of growth of women in the labor force has slowed somewhat during the last decade of the twentieth century. One cultural shift that appears to be contributing to this curiosity is the renewed emphasis on marriage and family. Tradition has held that men were expected to be the primary wage earners of the family, while women were expected to make the home. Renewed societal emphasis on these traditional roles for men and women during the 1990s has arguably placed greater pressure on men to work to support their families and placed greater pressure on women to stay at home. Some researchers attribute the slower growth rate to factors such as increased educational attainment by married women, the recession of the early 1990s, a rising birthrate, and a slowdown in women's return to work after giving birth. While these conditions have not led to lower unemployment rates for men or higher unemployment rates for women, it does appear they are be contributing to the slower employment growth rate for women.

MINORITIES. While the employment growth rate for women appears to be slowing, minority labor force participation is expected to continue to increase especially for non-white Hispanics. For example, Hispanics are predicted to be the second largest group in 2025, accounting for 17 percent of the total labor force. Furthermore, as of 2000, Hispanics have a larger share of the market than African Americans, 13 percent versus 12.7 percent. The share of African Americans in the labor force is expected to increase by only 1.8 percent during the same time period. Asians and other people of color would account for 8 percent of the labor force in 2025. Hispanics and Asians, therefore, will continue to be the two fastest growing groups.

UNEMPLOYMENT

Historically, women have endured higher rates of unemployment than men; however, this trend appears to be changing. Through the first quarter of 2005, the seasonally adjusted unemployment rate for women ages twenty and over was 3.9 percent, while the average rate for men in the same age range was 4.1 percent. The unemployment rate for African American women was higher, averaging 9.1 percent for the first quarter of 2005, while African American men were unemployed at a rate 10.9 percent.

OCCUPATIONS

The biggest percentage of women employed in the United States labor force are working in technical, sales, and administrative support occupations. Despite the increase of women working in professions that have traditionally been male-dominated, such as engineering, construction, athletics, truck driving, mortuary science, and law enforcement, most women still tend work in traditionally "female" occupations. However, one of the most significant changes that took place in the twentieth century was the rise of women managers. In 1900, only 4.4 percent of managers were women. By 2000, 46 percent of all managers were women, a tenfold increase. By 2002, 34 percent of working women were in a managerial or processional occupation. However, both women professionals and women managers are clustered in certain specialty areas. In 2002, nearly 50 percent of women workers were employed in three occupational groups—sales, services, and administrative support. As example, only 11 percent of engineers were women, but 98 percent of preschool and kindergarten teachers were women. Furthermore, only 19 percent of dentists were women, whereas 93 percent of registered nurses were women. Therefore, women are still underrepresented in many professions and overrepresented in others.

WOMEN ENTREPRENEURS

Businesses owned by women are increasing in terms of quantity, diversity, and impact on the American economy. In 2003, over 38 percent of self-employed persons were women and about almost 6 percent of employed women were self-employed. Furthermore, women-owned businesses employ over nineteen million people in the United States or 1 in every 7 employed persons nationwide according to figures published by the Center for Women's Business Research. As of 2004 there were 10.6 million women-owned businesses in the United States. Job growth provided by

women-owned businesses has exceeded the national averages in almost every major industry. Between 1997 and 2004 the number of businesses owned by women increased by 24 percent compared to 12 percent for all firms. Among the industries that have experienced the most dramatic growth in women-owned businesses are construction, manufacturing, wholesale trade, transportation, and communication. This growth in businesses owned by women has exploded despite the fact that female entrepreneurs generally have lower levels of credit available to them than businesses owned by men.

Many of the businesses owned by women are home-based. By 2002, 66 percent of all home-based businesses were owned by women. These businesses are changing the face of business since they enable many women to balance work and family commitments at home while fulfilling their business objectives.

WOMEN AND MINORITIES ON CORPORATE BOARDS

The combination of increased cultural and governmental pressure for corporations to add women to their boards has resulted in an increase of women seated on corporate boards. As of 2003, 89 percent of the corporate boards in the *Fortune* 500 had at least one female director. Nonetheless, women still only accounted for 13.6 percent of all corporate board members in 2003. Further, the same women often hold several of these seats on different corporate boards.

Although minorities have been entering the workforce in record numbers, their attempts to reach the top of the corporate ladder have been disappointing. For example, an examination of the *Fortune* 1000 companies reveals that only 3 percent have an African American on their Board of Directors. Only 1.97 percent of *Fortune* 1000 board seats are held by Hispanics and Hispanic women hold only three tenths of all *Fortune* 1000 board seats. That is just 34 out of 10,314 seats. In addition, only seven Hispanic women serve as executive officers at *Fortune* 1000 companies.

LAWS AFFECTING EMPLOYMENT OF WOMEN AND MINORITIES

THE EQUAL PAY ACT OF 1963. The Equal Pay Act of 1963 was enacted as an amendment to the Fair Labor Standards Act. The Equal Pay Act forbids employers from paying employees different wages or salaries based on sex. The act mandates that employers may not pay men and women different wages if their jobs require equal skills, effort, and responsibilities and occur in the same work environment. If men and women in the same jobs do receive different pay, their pay must be equalized by raising the lower pay rather than lowering the higher pay. The Equal Pay act specifies four instances in which differences in pay are permitted: (1) under a seniority system; (2) under a merit system; (3) under a system that measures earnings by quantity or quality of production; or (4) under a differential system based on any other factor besides sex.

The act is administered by the Equal Employment Opportunity Commission (EEOC). To ensure enforcement, employers are required to keep records documenting employee hours, pay rates, job descriptions, and other relevant information. If employers violate the act, they may be required to pay back wages and possible punitive damages.

TITLE VII OF THE CIVIL RIGHTS ACT OF 1964. Title VII of the Civil Rights Act of 1964 prohibits discrimination in hiring, firing, promotion, assignment, and other treatment of persons in the workplace based on race, color, national origin, religion, or sex. Title VII applies to both public and private employers, employment agencies, and labor unions with fifteen or more employees or members. As with the Equal Pay Act, the EEOC administers enforcement of Title VII (Civil Rights Act of 1964).

In addressing claims, the courts have held that sex discrimination under Title VII refers to discrimination based on gender and not related to sexual orientation. In addition, while Title VII does not ban discrimination based on marital status, there are many state laws that forbid such discrimination.

SEXUAL HARASSMENT. Subjecting women to sexual harassment in the work place is considered a form of sex discrimination under Title VII. Generally, there are two primary forms of sexual harassment: quid pro quo, and hostile environment.Under the quid pro quo-type of sexual harassment, a victim (usually a woman) is either promised a reward (i.e., pay raise, promotion, etc.) in exchange for sexual favors, or threatened with punishment for not complying with sexual requests. These requests can be expressed or implied.

Under the hostile environment theory, the employer is charged with creating conditions, or allowing others in the work place to create conditions, that make the work environment extremely unpleasant or hostile for the victimized employee(s) (usually women). The types of activities that may contribute to a hostile work environment include: displaying sexually suggestive pictures; using offensive or sexually suggestive language; discussing sexual activities; talking about a person's physical characteristics; inappropriate touching, etc.

Employers have a legal obligation to prevent either type of sexual harassment from occurring in the work place. Businesses usually establish detailed policies to try to prevent sexual harassment situations from arising in the work place.

PREGNANCY DISCRIMINATION ACT. Title VII of the Civil Rights Act was amended in 1978 by the Pregnancy Discrimination Act, which bans discrimination against women in employment because of pregnancy, childbirth, and related medical conditions. This act provides that women covered by the law "shall be treated the same for all employment-related purposes, including receipt of benefits under fringe benefit programs."

EXECUTIVE ORDER 11246. President Lyndon B. Johnson issued Executive Order 11246 in 1965. This order mandates that companies who do business ($10,000 or more annually) with the federal government must take affirmative actions to increase the representation of women and minorities in their employment ranks. If a company in question does more than $50,000 of annual business with the federal government, its affirmative action plan must be in writing.

FAMILY AND MEDICAL LEAVE ACT OF 1993. Enforced by the U.S. Department of Labor, the Family and Medical Leave Act applies to private employers with fifty or more employees and to all governmental employers, and requires employers to provide up to twelve weeks of unpaid leave to employees who have undergone childbirth; adoption; personal illness or injury; or illness or injury of a child, parent or spouse. During the leave period, the employee's health benefits must remain intact. Once the employee returns from the unpaid leave, the employee is entitled to return to the same or comparable position.

CONCERNS OF WOMEN AND MINORITY WORKERS

PAY DIFFERENCES. Despite the progress women made during the twentieth century, differences remain in the average pay of men and women. Although between 1979 and 2003 the earnings gap between women and men narrowed significantly, according to the Bureau of Labor Statistics, women still earned seventy-nine cents to every dollar earned by men in 2003. Women's earnings tend to rise with the level of education they possess; for example, in 2003 women with a college degree earned approximately $800 per week compared to $320 for those with less than a high school diploma.

In addition, white women earned 15 percent more than African American women and 38.3 percent more than Hispanic women as of 2003. Nevertheless, the gender gap in terms of earnings is not as dramatic among African Americans and Hispanics. Both African American and Hispanic women earned 88 percent of their male counterparts in 2003. Within different occupational categories, there are notable gender differences in terms of pay; for example, in professional specialty occupations have earnings that are about 75 percent of those of men. This difference is due partly to women's concentration in lower-paying professional occupations such as nursing and teaching. In the professional and related occupations, women are much less likely to work in some of the highest paying fields, such as engineering and computer and math related fields.

MATERNITY, PREGNANCY, CHILD BIRTH, AND CHILD CARE. According to the U.S. Department of Labor, 99 out of every 100 women will work for pay in the United States at some point in their lives. Further, the number of families in which a woman is the head of the household and no male spouse is present is continuing to rise. In 2003, women were the primary breadwinners in over 22 percent of all families in the United States, and 72 percent of these female heads of households were employed. Furthermore, the proportion of married-couple families in which only the wife worked rose to 6.8 percent in 2003. With so many women in the workforce—both single mothers and married women—many of these women were concerned with balancing work with pregnancy and child-care issues.

Despite the increasing need for child care as more mothers work outside the home, very few companies have policies for dealing with working parents who need outside child care. Although it is still common for women to quit their jobs or delay advancement at work because of child bearing, many women appear to be setting aside motherhood in pursuit of the executive suite. A 2001 nationwide survey of high-earning career women found that 33 percent of them are childless at ages 40–55. However, a survey of 187 of *Fortune* Magazine's Most Powerful Women in Business found that 72 percent were mothers. In fact, as of 2003 nearly three-quarters of all mothers were in the labor force including more than 60 percent of those women with children under the age of three. Therefore, working women continue to be plagued by the challenge of balancing work and family roles. Historically, women have taken less demanding, lower paying jobs, and it is often the case that the structures, habits, values, and atmospheres of work become organized around the availability of women whose top priority is their children.

In addition to the challenge of finding childcare, some working women are forced to face the issue of pregnancy discrimination. Despite the fact that the courts have banned pregnancy discrimination as a form of sex discrimination under Title VII of the Civil Rights Act, working women are still dealing with the problem. In 2004, 4,512 women who claimed that they were discriminated against as a result of pregnancy filed charges with the EEOC. Of the claims that were found to have merit, employers

were forced to pay over $11 million in damages (not including litigation).

ALTERNATIVE WORK SCHEDULES. The increasing number of women in the work place has generated a demand for alternative work schedules. Since women have traditionally operated as managers of the household and primary caretakers for their children, they have often required greater flexibility in their work schedules to balance work and family obligations. Alternative work schedules have attempted to offer the dual benefit of providing women with flexible schedules to meet their family obligations while enabling employers to benefit from the work women have to offer. Generally, alternative work schedules can take several forms: (1) flexible work schedules, (2) compressed work schedules, and (3) job-sharing. Each of these types of work arrangements represents a departure from the traditional fixed schedule of 8 hours per day, 5 days per week, beginning and ending at the same time each day.

Flexible work schedules allow an employee to determine her own schedule within specified parameters. Employers may allow employees to vary their starting and ending time daily or to adhere to a predetermined fixed starting and ending time. Under a system of compressed work schedules, full-time employees may still work forty-hour weeks; however, they may work four 10-hour days and take one day a week off. Another arrangement may exist when an employee works four 9-hour days and one 4-hour day.

Job sharing is where two employees share the same job; these two employees may alternate days, or one may work mornings and the other works afternoons. Employers are under no obligation to offer alternative work schedules; however, many employers are recognizing that it is in their interest to offer some such arrangement in order to avoid alienating a valuable segment of the workforce. Alternative work schedules allow employers to attract female employees who can make significant contributions to the company while fulfilling their family commitments at the same time.

In 2003, 25 percent of all female salary workers worked fewer than 35 hours per week. In contrast, only 11 percent of employed men worked part time.

SEXUAL HARASSMENT AT WORK. Despite legislative and judicial efforts to minimize incidences of sexual harassment at work, it is still a significant problem for women in the work place. In 2004 a total of 13,136 claims of sexual harassment were filed with EEOC and with the state and local Fair Employment Practices agencies around the country that have a work-sharing agreement with the Commission. Of these complaints, women filed 84.9 percent of them. The damages awarded based on many of these claims (not including awards from litigation), totaled approximately $37.1 million.

Employers have clear incentives to prevent sexual harassment from occurring in the work place; the courts have determined that sexual harassment is a form of sex discrimination under Title VII of the Civil Rights Act of 1964. Employers found guilty of sexual harassment or allowing it to occur can be forced to pay substantial damages. Beyond the legal and monetary penalties, companies can suffer because sexual harassment can lead to lower productivity, absenteeism, employee turnover, poor morale, and devastating publicity for the company.

WOMEN AND MINORITIES IN MANAGEMENT

Despite the growing number of women in the labor force, women are still struggling to completely infiltrate the ranks of managers and executives. In the executive suite, women made up 15.7 percent of corporate officers in the *Fortune* 500 in 2002. In 2003, they held 13.6 percent of board seats in the same companies. But their actual numbers, compared to the percentage of women in the workforce, are still insignificant.

In a similar fashion, many minorities have topped out at entry or mid-level management positions. In 2003, African Americans hold less than 1 percent of the senior-level corporate positions in America's 1000 largest companies despite equal opportunity and affirmative action programs.

THE GLASS CEILING. While the numbers of women entering the workforce and rising to management are growing, women still have trouble advancing past middle-level management positions. Even many women who do rise above middle management find it difficult to secure a position at the top of the organizational structure. Many observers describe this as a "glass ceiling" acting as a barrier between women and the top-level positions they are striving for.

For years minorities have faced these same invisible, subtle, yet very real institutional barriers to promotions into higher level executive positions. The belief that minority groups reach organizational plateaus consisting of artificial barriers that derail them from senior management opportunities has been alternately termed "the brick wall." These barriers found in the structure of many organizations have often stymied the advancement of these select employee groups.

It has also been suggested that as a consequence of occupational sex segregation, many women confront "glass elevators" rather than "glass ceilings." Of the executive positions held by women most are in non-manufacturing companies and positions placing emphasis on employee relationships. In addition, recent

research suggests that the "glass cliff" may have replaced the "glass ceiling" for some women. It is suggested that women managers in the public sector seem to be more at risk than their male counterparts.

Nonetheless, both women and businesses continue to wrestle with issues related to these "glass" phenomena. While the existence of these barriers has been acknowledged for at least a decade, their persistence indicates that efforts to break them have been largely unsuccessful. Among the advice that women have been given to help break through the glass ceiling are: exceed performance expectations; develop a style with which male managers are comfortable; look for challenging assignments; and find influential mentors. Additionally, removing these gender barriers may make good business sense. The "glass ceiling" may lead to disillusionment and higher turnover among very capable women. Also, if irrelevant factors are used to exclude women from the top management positions, all employees may begin to assume that similar extraneous factors would affect their future progress in an organization.

As more women reach the upper levels of management and start their own businesses, the odds increase that women will have increased opportunities at all levels of business. Nonetheless, U.S. corporations still have a tremendous distance to travel before women can say that they enjoy equal opportunity in the workplace.

SEE ALSO: Diversity; Entrepreneurship; Mentoring; Sensitivity Training; Work-Life Balance

Patricia A. Lanier

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WORK-LIFE BALANCE

Helping employees balance work and non-work responsibilities has been a growing concern of

corporations for more than twenty years. The interest in work-life balance issues began in the 1980s as more women entered the workplace and focused primarily on helping employees balance work and family responsibilities by offering family-friendly benefits. These practices are now aimed a work-life balance, which is a more encompassing term that reflects the desire of nearly every employee for more flexibility in their work in order to mange the competing demands of work and life outside of work.

While many employees enjoy the benefits of work-family balance practices, many were inspired by changes in the workforce over the last two decades. These changes include increases in the number of employed women, especially mothers, single-parent families, and dual-income families. Additionally, many employees are now responsible for caring for elderly parents and other relatives. Corporate interest in family-friendly practices has steadily escalated as companies have realized the advantages of providing work-life balance benefits.

THE CHANGING WORKFORCE AND GROWING CORPORATE INTEREST

A number of changes in workforce demographics have brought work-life balance issues to the attention of companies. The major change related to the need for family-friendly benefits is the number of women in the U.S. workforce, which has more than doubled since 1970. Additionally, more women are remaining in the workforce after marriage and after having children, increasing the number of dual-career households in America. Add to this a larger number of single women with children in the workforce in the past two decades, and there is increased demand for family-friendly work policies.

Although the trend toward work-life balance practices began with demands from mothers in the workforce, the push now is coming from all employees: fathers and mothers, single parents, and employees with responsibilities for caring for aged relatives, and even employees who just want more flexibility in their daily lives. Nine out of ten workers in America live in households with family members, and nearly half of all employees have care-giving responsibilities. Recognizing these changes, corporations are creating work environments that make it possible for employees to be both good workers and good caregivers. However, the corporate motive for work-life balance policies is more than altruism and a desire to help and support employees. Employers have realized that it makes good business sense to provide such benefits. It helps with recruitment and retention of employees by creating an atmosphere of loyalty to the corporation.

Programs and benefits that directly address work-life balance issues include:

- dependent care (child-care and elder-care programs)
- flexible or alternative work schedules (flex-time, compressed work weeks, telecommuting, job sharing, and part time employment)
- leaves (paid and unpaid family care leaves, maternity phase-back, and so on)

Corporate America's growing concern for family issues is evidenced by the number of business journals that identify and rank family-friendly corporations. *Working Mother* was the first periodical to write a lead story on family-friendly companies. This article has appeared annually since 1986 and is called "Best Companies for Working Mothers." It identifies the top 100 work-life sensitive companies, assessing compensation, opportunities for women, child-care benefits, flexibility in work, and other benefits such as paid maternity and paternity leave. Additionally, *Business Week* magazine ran its first major cover story on "Work & Family" in 1993 at the time the Family and Medical Leave Act was enacted., and in 1996 *Business Week* launched in a major cover story issue a biannual ranking of the "Best Companies for Work and Family." Finally, the third major business periodical to rank companies was *Fortune.* Their "The 100 Best Companies to Work for in America" was first published in January 1998. Evidence from their study indicated that family-friendly polices help the bottom line.

TYPES OF WORK/LIFE BALANCE BENEFITS

CHILD AND DEPENDENT CARE PROGRAMS. In the last decade, there has been an increase in the number of day-care centers in America, and only about 28 percent of families with children had a parent who stayed home full time. This has prompted many organizations to either provide or subsidize day care for employees. Additionally, some companies provide assistance for child care for older children before and after school. This is an important concern of employees with school-age children because elementary school students typically spend 1,032 hours a year in school whereas full-time employees spend 2,025 hours per year at work. This leaves a 1,000-hour discrepancy. Employee concern about care before and after school is increasingly recognized as a drain on productivity and morale. Employers who provide this benefit report increased retention of employees who take advantage of it. The positive relationship between the availability of child-care centers and employees' performance was identified by a study done at the University of Michigan. Attitudes, recruitment and

retention, and performance were all more positive when child-care centers were available.

However, not all companies can provide on-site child-care or after-school programs. In these instances the company can provide information about referral services and tax-free salary withholding for flexible spending accounts. Companies can also support community programs that provide care. Similar programs can be set up for elder care needs. Hewitt Associates determined in a 2003 study that 94 percent of large employers surveyed allowed employees to put aside pre-tax earnings for child care into flexible spending accounts that 13 percent of large corporations surveyed offered on-site or near-site child care, and 13 percent offered “backup emergency childcare” for when regular child care was temporarily unavailable.

FLEXIBLE WORK PROGRAMS. Flexible work programs accommodate employees by allowing variations on when and where they do their work. Flexible work programs consist of flextime, compressed workweeks, telecommuting, job sharing, paid time off, and other leave programs.

In the past, employees arrived at work at 8 a.m. or 9 a.m. and left at 5 p.m. But now changes in employees’ personal lives make flexibility in work arrangements an important benefit. Flextime allows employees to vary the start and end times of their work day, and employees are typically required to be present during certain core hours (e.g., 10 a.m.–2 p.m.) but still working eight hours per day. This is one of the most frequently provided work/life balance benefit, and is well-liked by many different employees. Flextime allows all employees-those with children and those without-the ability to better manage their work and non-work lives. A 2003 poll of over 600 companies conducted by the Mellon Financial Corporation indicated that the number of employees who are allowed flexible work arrangements has doubled from 32 percent in 1996 to 71 percent in 2003.

The compressed workweek is a type of scheduling plan in which full-time hours are worked in fewer than five days. For instance, employees may work four 10-hour days and always have a three-day weekend. The compressed workweek is intended to allow employees more flexibility by having more days away from work; however the longer hours worked each day may actually detract from productivity and from work/life balance.

Telecommuting, or working out of one’s home and communicating with the workplace through technology, is on the rise for a number of reasons. First, technology has improved steadily over the past few decades, allowing faster and higher quality communication from home. Access to the Internet is the primary reason that people can now work effectively out of their homes. Another reason for an increase in telecommuting is many employees’ desire to commute less often. With dual-career families in which spouses work in different cities, or in large urban areas, employees may find some hours of their day taken up with a long commute. By telecommuting even a few days a week, employees can cut devote more time to work and/or family. Additionally, telecommuting can reduce pollution associated with driving to work. While telecommuting shares many of the advantages of other flexible work arrangements, it has some distinct disadvantages.

The primary disadvantage is the employee’s lack of access to the workplace, supervisors, coworkers, and even customers. If a person’s work is improved through the physical presence of the employee in the workplace, it may not be advisable to institute telecommuting. A second major concern with telecommuting is the inability to supervise the remote worker. While many employees are not allowed to telecommute until they have a record of effective performance in the workplace, performance problems resulting from a lack of supervision may arise in some cases. Finally, a major drawback is that the employee loses touch with the organizational culture; the patterns of behavior that one observes in a certain workplace are not as easy to learn when a person is absent from that workplace. This may be irrelevant in some workplaces, but crucial to meeting objectives in others. Additionally, by being absent and perhaps not learning the organizational culture, the employee may reduce his or her ability to be promoted.

Job sharing is allowing two employees with complementary schedules to split the responsibilities of a single traditional full-time job. This typically allows employees to keep the fringe benefits of a full-time position, while working fewer hours. Job-sharing may be used temporarily when an employee reduces hours, perhaps to continue working while managing childcare duties. A 2002 study conducted by Hewitt Associates studied the benefits provided by more than 1,000 companies and found that 28 percent of organizations offer job sharing. While job sharing accommodates the schedules of employees, having two people accountable for one position may result in conflict. Therefore, care should be taken when allowing employees to job share.

Paid time off, in the form of vacation days, sick days, and other forms of paid absences, are ways to help employees manage issues associated with health, school, leisure, or any other non-work activity. Many employers now allow employees to draw leave time from a single pool for any type of leave rather than allowing only a fixed number of days for each type of absence. Leaves and time-off programs include paid and unpaid authorized leaves such as sabbaticals,

social service leaves, leaves for emergencies, paid leave banks, and family-care leaves. Many employees want and need leaves in addition to annual vacations for reasons such as care of newborns or sick family members and for personal interests or volunteer work. These leaves are different from flexible work schedules in that flextime addresses when and where the work gets done; time-off programs provide employees with leave during unusual or emergency times. Many companies provide this benefit by leave-sharing programs. These allow employees to voluntarily donate their paid time off to coworkers. Companies may also offer paid leave banks in which employees are given a single pool of time off to use for vacations, personal time, illnesses, and family emergencies. Employers using paid leave banks do so to provide flexibility to employees and to assist managers in scheduling time off. However, the availability of more flexibility for leave time may hinder the organization if key employees are absent when needed, and thus, these programs must be properly managed.

FAMILY AND MEDICAL LEAVE ACT

The Family and Medical Leave Act of 1993 (P.L. 103-3) brought a major change in the attitudes toward leaves in the business world. It requires businesses with 50 or more employees to provide employees with at least 12 weeks a year of unpaid leave for birth, adoption, or personal or family illnesses. Employers must pay health-care coverage during the leave and return employees to their same or equivalent jobs. Social and demographic changes were the impetus for this law; the law, along with pressure stemming from the same social and demographic changes, has driven the adoption of family-friendly benefits. Families may no longer have a full-time parent at home. Employees need time off to care for themselves or family members such as sick children, spouses, and elderly relatives. Impetus also came from other countries, primarily western European countries, Canada and Japan, all which have family leave policies more generous than those outlined in the Family and Medical Leave Act. In 1993 the United States was the only country of 188 surveyed by the International Labor Organization that had no mandatory parent leave law.

Most business groups opposed the FMLA on the grounds that it would reduce business efficiency and add administrative costs to employers. However, studies generally have found that it has not been a major burden or had a significant impact on employer costs. In a study conducted by Westat for the U.S. Department of Labor in 2000, respondents indicated that the FMLA had either no noticeable effect or a positive effect on the business productivity (83 percent), profitability (90 percent), and growth (90 percent) of their company. Further, respondents indicated that intermittent leave, which was posited to be most disruptive to organizations, had no impact on productivity (81 percent) or profitability (94 percent). Not only did businesses report few negative effects from the FMLA, nearly 79 percent of the employees surveyed in the study indicated that the leave had positive effects on their ability to care for family members.

WORK-LIFE BALANCE AND THE BOTTOM LINE

Companies often seek to add work-life balance benefits because it makes good business sense. The three top reasons are (1) recruitment/retention of employees, (2) commitment to the firm, and (3) productivity. Retention is important to employers, and will become more critical as baby boomers retire and are replaced by smaller generations. Additionally, employee retention is increasingly valued as corporations realize that the cost of recruiting and training is more expensive than providing work/life balance benefits.

Several research studies have been done to determine the effects of work-life balance benefits. Paul Osterman, in a major 1995 study, suggested three reasons for employers to adopt work/family programs: to lower absenteeism rates, to bolster recruitment and retention of employees, and to encourage commitment to the firm. In another study by Steven L. Grover and Karen J. Crooker, published in *Personnel Psychology,* the authors found a relationship between employee commitment and benefits such as parental leave, flexible scheduling, child-care assistance, and child-care information. An interesting aspect of this study was that employee commitment increased regardless of whether the employee was a user or nonuser of the benefits. In a more recent study done by Aeon Consulting in 1998, family-friendly benefits were again correlated with employee commitment. A study published in 2004, conducted by Wendy Caser and Louis Buffardi, indicated that flexible scheduling and dependent care assistance offered by organizations were related to applicants' intentions to pursue jobs at these companies.

Further, a report by the Families and Work Institute entitled *The 1997 National Study of the Changing Workforce* found that the quality of workers' jobs and the supportiveness of the workplace are predictors of productivity, job satisfaction, commitment, and retention. This study was based on 2,877 employees. In contrast to the positive effect of a supportive workplace, the study found that difficult and demanding jobs in nonsupportive environments tended to suffer from poorer job performance.

BACKLASH FROM CHILDLESS EMPLOYEES

One concern with the introduction of new family-friendly programs into the workplace is backlash from

childless employees. These employees may feel that they are not getting the same level of benefits as their coworkers with children, because they cannot take advantage of the programs in which the organization has invested. As such, employees with children receive more total compensation (because of the added benefits) than do childless employees. This problem may be alleviated with a flexible benefits plan, in which those employees who do not choose family-friendly benefits may choose other types of benefits. Additionally, experts suggest that employers develop "work/life" programs that allow employees flexibility for any activity outside of work, rather than just "family-friendly" benefits for employees with children. Thus, if all employees are able to take advantage of flexible hours, telecommuting, or other types of work arrangements to better manage their lives, then the policies are likely to be accepted by all employees.

SEE ALSO: Employee Benefits; Employment Law and Compliance; Human Resource Management; Women and Minorities in Management

Judith M. Nixon
Revised by Marcia Simmering

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WORLD-CLASS MANUFACTURER

The term "world-class manufacturer" is popularly used to denote a standard of excellence: the best of the best manufacturers at the international level. It came into prominence following the 1986 publication of *World Class Manufacturing: The Lessons of Simplicity Applied* by Richard J. Schonberger, which was his follow-up to *Japanese Management Techniques: Nine Hidden Lessons in Simplicity.*

World marketplace events during the 1970s and 1980s caused competition to grow to such an intense level that many firms were forced to re-examine their concept of manufacturing strategy, especially in terms of the tradeoffs among the four competitive priorities: cost, quality, delivery/service, and flexibility. Managers began to realize that they no longer had to make these tradeoffs but could instead compete on several competencies.

Some of those excited by the concept describe it as capturing the breadth and the essence of the fundamental changes taking place in larger industrial enterprises, with their overriding goal and underlying mindset of continual and rapid improvement. Others describe it as the culmination of the relentless pursuit of competitive excellence. Richard Schonberger states that the emphasis on world-class manufacturing may someday be chronicled as the third major event in the history of manufacturing management, following the use of standard methods and times espoused by Frederick Taylor and Frank Gilbreth, and the findings of the Hawthorne experiments at Western Electric, which held that motivation, to a significant degree, comes from recognition. For simplicity's sake, we will describe a world-class manufacturer as a company that is able to compete effectively in a global market.

Clearly, there are some demands placed on individuals and organizations that desire world-class status. Peter Stonebreaker and Keong Leong presented a hierarchy of steps, appearing as five levels, that lead to world-class operations (see Figure 1). This series of steps will be used to describe the characteristics of world-class manufacturers.

Figure 1

The Journey to World-Class Manufacturing

Source: Stonebreaker, Peter W. and Leong, G. Keong, Operations Strategy: Focusing Competitive Excellence. Boston: Allyn and Bacon, 1994, pg. 578.

LEVEL ONE: BUSINESS AND OPERATIONS STRATEGY

All world-class manufacturers have an explicit, formal manufacturing mission. Within this mission is the operating goal to become world class. They use competitive information to establish organizational goals and objectives, which they communicate to all members of the enterprise. They regularly assess the appropriateness of these objectives to attaining and maintaining world-class status.

World-class manufacturing requires an overall willingness to establish closer connections with everyone, from suppliers to workers. It requires an unwavering commitment to self-analysis and improvement. It requires an aggressive approach to technology that can turn visionary strategies into reality. All of these must be reflected in the firm's business and operations strategy if world-class status is to be attained.

LEVEL TWO: ORGANIZATION DESIGN, HUMAN RESOURCES, TECHNOLOGY, AND PERFORMANCE MEASUREMENT

The following sections discuss how organization design, human resources, technology, and performance measurement factor into an organization's effort to become a world-class manufacturer.

ORGANIZATION DESIGN. World-class manufacturers integrate all elements of the manufacturing system in such a way that the needs and wants of its customers are satisfied in an effective, timely manner. This requires the commitment and the expenditure of efforts and resources by all elements within the system to ensure their proper integration. This commitment extends to outside elements as well, as the world-class manufacturer encourages and motivates its suppliers and vendors to become co-equals with the other elements of the manufacturing system.

World-class manufacturers work to eliminate organizational barriers to communication and to organize the firm in such a way that the core values needed to reach world-class status take precedence. In fact, most companies that have succeeded in implementing many of the world-class tools—such as just-in-time production (JIT), total quality management (TQM), manufacturing resource planning (MRP II) and total productive maintenance (TPM)—already had the core values well in place. Companies that are already world class are able to quickly absorb other world-class manufacturing concepts as they are developed and publicized.

HUMAN RESOURCES. World-class manufacturers recognize that employee involvement and empowerment are critical to achieving continuous improvement in all elements of the manufacturing system. The continuity of organizational development and renewal comes primarily through the involvement of the employee. World-class companies invest comparatively more in their relationships with their workers, providing significantly more training than their competitors. An *Industry Week* survey found that firms approaching world-class status were three to five times more likely to report "highly effective" human-resources programs than other firms. Some analysts note that combining lean manufacturing principles with employee participation can help firms become world-class manufacturers.

TECHNOLOGY. A great deal of emphasis is placed on technology, equipment, and processes by those trying to attain world-class status. World-class manufacturers view technology as a strategic tool for achieving and maintaining their world-class status. A high priority is placed on the discovery, development, and timely implementation of the most relevant technology available and the identification and support of those who can communicate and implement this technology. The most highly competitive firms have made significantly more progress than others in implementing TQM, reengineering, simultaneous engineering, group technology, computer-assisted manufacturing (CAM), material resources planning (MRP), and the use of local area networks (LANs).

PERFORMANCE MEASUREMENT. World-class manufacturers recognize the importance of measurement in defining the goals and performance expectations for

their organization. They routinely adopt or develop the appropriate performance measurements needed to interpret and quantitatively describe the criteria used to measure the effectiveness of their manufacturing system and its interrelated components.

Use of the proper measurements allows world-class manufacturers to assess their performance against themselves (internal benchmarking), their competitors (competitive benchmarking), and against other world-class manufacturing firms that are not competitors (generic and functional benchmarking). World-class status is achieved through a relentless commitment to continuous improvement, which cannot be achieved without measurement.

LEVEL THREE: INFORMATION SYSTEMS, MANAGEMENT DIRECTION, AND OPERATIONS CAPABILITIES

The following sections discuss how information systems, management direction, and operations capabilities factor into an organization's effort to become a world-class manufacturer.

INFORMATION SYSTEMS. World-class manufacturers require world-class information systems for collecting, processing, and disseminating data and for providing the feedback mechanism that is necessary for meeting their objectives. Information systems are fully integrated into the business processes of firms that adhere to continuous improvement and TQM strategies. Capturing and analyzing customer feedback and designing, manufacturing, and delivering world-class quality products and services is rooted in superior information systems. Richard Schonberger states that functions within a world-class firm all have a common language and signaling system. World-class firms embrace computerized maintenance management and computer-integrated manufacturing. Additionally, organizational commitment to continuous improvement is supported by the strategic use of information systems.

MANAGEMENT DIRECTION. Management is responsible for directing the manufacturing organization's journey to world-class status and for creating an organizational culture committed to all that is necessary for achieving continuous improvement. Corporate culture and values are the foundation for superior manufacturing, which in turn reflects and is reflected by the caliber of corporate management. This implies that personal commitment, involvement, and a sense of direction by management are critical to the success of world-class firms.

The manufacturing excellence needed for world-class status is nurtured by direction from superior management, which must penetrate the manufacturing function, viewing and managing it as an integral, indivisible part of the firm. It cannot tolerate mediocrity or even average manufacturing performance.

Management must seek to describe and understand the interdependency of the multiple elements of their manufacturing system, to discover new relationships, to explore the consequences of alternative decisions, and communicate unambiguously within the organization and with the firm's customers and suppliers. Stimulating and accommodating continuous change forces management to experiment and assess outcomes. They must be able to translate knowledge acquired in this way into some sort of direction, framework, or model that leads to improved operational decision making, while incorporating a learning process into their fundamental operating philosophy. The objective of world-class status tests management's ability to learn, adapt, and innovate faster in the face of an intensely competitive global market.

OPERATIONS CAPABILITIES. World-class manufacturers are concerned with whether their operations systems have the ability to meet design specifications, rather than with evaluating the quality and quantity of products after the fact. In order to attain world-class status, the manufacturing firm has to be given the proper resources. With these resources, the firm must have the capability to produce the right quantity, the right quality, at the right time (often just in time), and at the right price. The proper technology must be on hand or readily attainable. In addition, the firm must have the necessary managerial capabilities to compete successfully on a global basis. For many firms, the necessary operational capability involves the ability to provide customers with a large degree of flexibility of either product or volume, or exceptional response time to orders, changes in orders, or new product development.

Beyond the firm itself, operations capability implies a superior interactive relationship with all vendors and suppliers. World-class firms have extensively implemented JIT, are heavily involved with programs that contractually commit suppliers to annual cost cuts, and are making efforts to involve the supplier early in the new product development process.

LEVEL FOUR: QUALITY

World-class manufacturers place an emphasis on quality. Firms in this category are usually in an advanced state of TQM implementation, continually seeking to enhance their business. All quality costs (prevention costs, appraisal costs, and cost of defects—both internal and external) are evaluated and held to the lowest reasonable sum. "Zero defects" is the goal of the world-class manufacturer. In order to achieve zero defects, the world-class firm is educated in and has fully

implemented statistical quality control (SQC), sometimes called statistical process control (SPC) or quality at the source. Hence, quality is maintained and elevated through quality planning, quality control, and quality improvement. In conjunction with this effort to improve processes and products, world-class firms utilize an activity called benchmarking. This involves comparing the firm's performance, either overall or in a functional area, with that of other world-class organizations. The use of TQM techniques, according to some analysts, is the most striking differentiator between world-class and non-world-class firms. Quality has also been found to be the most important competitive differentiator in the eyes of the customer.

LEVEL FIVE: CUSTOMER SERVICE

World-class manufacturers instill within their organization and constantly reinforce the idea that all who are a part of the organization must know their customers and must seek to satisfy the wants and needs of not only the customers, but also all other stakeholders. The goal of satisfaction is pursued in regards to the product, order processing, delivery, quick response to changes, and service after the sale. After all, the goal of continuous improvement is to improve processes and add value to products and services in such a way as to increase customer satisfaction and loyalty and ensure long-term profitability.

LEVEL SIX: WORLD-CLASS MANUFACTURING

While world-class manufacturing may be difficult for manufacturers to define, many say they know it when they see it. Whatever it is, it must be from the customer's vantage point. An *Industry Week* survey found that, among factories approaching world-class status, a higher percentage were likely to belong to public companies; have corporate parents with revenues greater than $1 billion; participate in an automotive industry value chain; and employ 250 or more people at the location. These firms reported large cost reductions over the previous three years, as well as increased revenues, higher capacity utilization, higher sales per employee, and returns on invested capital (ROIC) that exceeded that of other manufacturers. Daniel F. Baldwin states that truly world-class firms are always examining their business processes and continuously seeking solutions to improve in key areas, such as lead time reduction, cost cutting, exceeding customer expectations, streamlining processes, shortening time to market for new products, and managing the global operation.

World-class manufacturers are the ones that possess the knowledge and technology to provide products and services of continually improving quality. It is what separates practitioners of the new paradigm from the industrialist dinosaurs.

SEE ALSO: Benchmarking; Customer Relationship Management; Human Resource Management; Management Awards; Performance Measurement; Quality and Total Quality Management

R. Anthony Inman

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Z

ZERO-BASED BUDGETING

The budgeting process is an essential component of management control systems and has been an effective system by which management can successfully plan, coordinate, and control. The process involves the creation and implementation of the broad objectives of an organization, the detailed objectives, and a short-term and long-term financial plan. The philosophy and procedures used to implement zero-base budgeting in industry and government settings are quite similar, only slightly differing with the mechanics to fit the specific needs of each organization.

The basic process of zero-based budgeting is to justify budget requests every budgeting cycle, regardless of prior period budgets. The following sections address the specifics including the history, implementation, drawbacks and solutions, and behavioral impacts of zero-based budgeting.

HISTORY OF ZERO-BASED BUDETING

Government budgeting was established in Great Britain in the late 17th century. The enactment of the 1689 Bill of Rights gave taxing authority to Parliament as opposed to the King. Parliament gradually established spending programs and by the 1820s published detailed annual financial statements showing revenues and expenditures and a projected surplus or deficit. The usage of budgets by the United States government did not begin until 1800 when a law was passed for the Secretary of the Treasury to submit an annual financial report to Congress. This action was not taken by the Treasury department, and instead, federal government agencies developed their own reports and submitted them to the Treasury.

Several attempts were made in the early 1900s to implement federal budgeting and financial management, but each failed, even though 44 individual states had already passed laws concerning budgets. Congress passed the Budgeting and Accounting Act in 1921 along with the creation of a centralized Bureau of the Budget. Although created in 1921, it was not until the mid-1940s that the federal budget included identification of the major goals and program objectives, a systematic analysis of supplies and needs for both military and civilian purposes, and a long-range plan of projects. In the 1960s, the Planning-Programming-Budgeting System (PPBS) was adopted by President Lyndon B. Johnson to be implemented throughout the federal government.

The PPBS was short-lived, however. In the 1970s, every federal department except for the Defense Department abandoned the system. The concept of zero-based budgeting gained notoriety in 1977 when President Jimmy Carter announced he was introducing zero-based budgeting into the federal budgeting process. The term, "zero-based budgeting," and the techniques for carrying out these budgeting processes had been previously introduced in an article written by Peter A. Pyhrr in the Harvard Business Review in 1970, but former President Carter adopted this method at the federal level, zero-based budgeting began to spread more rapidly.

President Carter, while still governor of Georgia in 1973, contracted with Pyhrr to implement the system for the entire executive budget recommendations for the state of Georgia. However, when the system was applied to governmental budgeting, it failed due to the great amount of effort and time required development

and implementation. With further refinement, however, zero-based budgeting was largely hailed as a success when introduced to Congress in 1977.

Early business budgets focused on controlling costs and little emphasis on measuring effectiveness. In the early 1900s, the use of budgets increased due to the necessity for industries to implement more careful factory planning. A systematic plan of budgeting arose from two areas: industrial engineering and cost accounting. Scientific methods were used by industrial engineers to arrive at production standards, which could then be used to estimate future operations and performance standards. Cost accountants used budgeting to establish standard costs and to estimate future expected costs in a budgetary form. Also at this time, texts on budgeting and managerial accounting began to emerge.

As zero-based budgeting gained traction in the 1970s among public budgeting constituents, it also gained popularity among private enterprises, and during this time a number of organizations modified and implemented the system. An example of an organization successfully implementing this system is the Florida Power and Light Company. In 1977 zero-based budgeting became required for all Florida Power and Light general office staff departments. Ben Dady, the company's director of management control, favored the system because when managers develop the zero-based budget, they begin with nothing in terms of budgeted dollars, and have to justify or prove why they need to spend money on each activity or project for all the dollars they expect to spend. New and old problems are treated equally. Every managerial activity is properly identified and then evaluated by analyzing more efficient ways and alternative levels of performing the same activity. These alternatives are then ranked and relative priorities are established.

The publicity in the 1970s surrounding zero-based budgeting gave the impression that the system was a relatively new technique, although the system was not new at all. Zero-based budgeting is quite similar to the Planning-Programming-Budgeting system, implemented in the 1960s. Both systems involve evaluating the inputs and outputs for specific activities, as opposed to the traditional line-item format.

IMPLEMENTATION OF ZERO-BASED BUDGETING

The zero-based budgeting system puts the burden of proof on the manager, and demands that each manager justify the entire budget in detail and prove why he or she should spend the organization's money in the manner proposed. A "decision package" must be developed by each manager for every project or activity, which includes an analysis of cost, purpose, alternative courses of action, measures of performance, consequences of not performing the activity, and the benefits.

This approach is different than traditional budgeting techniques due to the analysis of alternatives. Managers must identify alternative methods of performing each activity first, such as evaluating the costs and benefits of making a project or outsourcing it, or centralizing versus decentralizing operations. In addition, managers must identify different levels for performing each alternative method of the proposed activity. This means establishing a minimum level of spending, often 75 percent of the current operating level, and then developing separate decision packages that include the costs and benefits of additional levels of spending for that particular activity. The different levels allow managers to consider and evaluate a level of spending lower than the current operating level, giving decision-makers the choice of eliminating an activity or the ability to choose from a selection of levels of effort including tradeoffs and shifts in expenditure levels among organizational units.

The decision packages must be ranked in order of importance once they have been created. This allows each manager to identify priorities, combine decision packages for old and new projects into one ranking, and allows top management to evaluate and compare the needs of individual units or divisions to make funding allocations. In this respect, zero-based budgeting is quite different than traditional rolling budgets. Rolling budgets often appeal to people who prepare budgets because they make budget development much easier. Managers can add an inflation factor to the previous year's budget and then include any adjustments for major changes. Rolling budgets also give management a concrete number to help make comparisons from year to year. However, traditional rolling budgets have a tendency to create conflict; they can create an incentive to spend money carelessly in order to justify the next year's budget. They can also create inefficient operations due to the fact that individual departments or units do not have to justify expenditures based on operations, but only on the prior year's expenditures.

Zero-based budgeting addresses such problems that can occur with traditional rolling budgets. In zero-based budgeting, each dollar spent by management must be justified with a detailed account of what will be purchased, how many labor hours are needed, what problems will be faced, and so forth. This allows management an opportunity to review operations in depth and make recommendations for changes to if necessary. The zero-based budgeting process helps managers identify redundancies and duplications among different departments, concentrating on the dollars needed for proposed programs as opposed to percentage increases or decreases form the previous year. Specific priorities of departments and divisions are identified more easily in zero-based budgeting.

The process also allows for the comparability of different departments as to the respective priorities funded. Zero-base budgeting enables a performance audit to determine whether each project or activity has been performed as efficiently as planned.

ZERO-BASED BUDGETING DRAWBACKS AND SOLUTIONS

One drawback to zero-based budgeting is cost in terms of managerial time; it takes a considerable amount of time to go through the process of reviewing operations in enough detail to justify costs each budget cycle without relying on past expenditures. One solution to this problem is to create a rolling budget every year and perform a zero-based budget every three to five years, or when a major change occurs within the operation. This allows an organization to benefit from the advantages of zero-based budgeting without an excessive amount of work. Likewise, traditional rolling budgets should never strictly rely on a prior-year budget plus a percentage; consideration should always be given to past numbers. In some cases, a zero-based budget may rely on some prior numbers where it is overwhelming to create a budget from scratch. Ultimately, the process gives top management the opportunity to judge the performance of managers in terms of allocating resources efficiently and effectively, and gives managers more responsibility in developing their budgets.

An organization should not feel that all budgets must be developed in entirely the same manner. Some departments can utilize an in-depth study of a zero-based budget while others can use a rolling budget. This is a way to spread the extensive work over a number of years instead of concentrating on one certain year. Many organizations have implemented the system in some form or another and found that it did not work. If properly implemented, however, the process could have a considerable improvement over traditional rolling budgets. The number and nature of decision packages varies from organization to organization; it is not uncommon for large organizations to identify several thousand packages. Furthermore, it is often hard or even impossible for top executives to have the necessary knowledge or time to develop and rank priorities for thousands of packages.

To alleviate this problem, managers, after ranking their own packages, can have their top executives rank the packages of all the managers that report to them. This approach is used by one of zero-based budgeting's pioneers, Texas Instruments. Another solution is for each level of management to rank a certain percentage of packages within its own area of responsibility. In this solution, the first level of management may rank 40 percent of the proposed packages; the next level may rank the next 40 percent of packages, while top management may concentrate on the remainder of the budget.

BEHAVIORAL IMPACTS OF ZERO-BASED BUDGETING

The impact of budgeting on organizations was probably first studied by Argyris in the 1950s. These studies show some of the behavioral effects resulting from the way budgets are used in organizations. The results of his research showed that the particular process used could cause dysfunctional behavior in subordinates, regardless of the degree of technical refinement of the budgetary system. In the 1970s, Hopwood's studies inquired into the effects of budgets on human behavior. These studies showed that the use by a superior of a budget-constrained style of evaluation gave rise to significant levels of job-related tension; had adverse effects on peer and subordinate-superior relationships, and was implicated in manipulative behavior on subordinates. A long line of studies have been performed since then to uncover an array of variables that govern the effects of reliance on budgets on behavioral outcomes, including managerial performance. Examples of these variables include budgetary participation, task uncertainty, environmental uncertainty, strategy, and culture.

Zero-based budgeting may require an extensive amount of time, money, and paper work; but it does provide a systematic method of addressing an organization's financial concerns, in turn enabling an organization to better allocate its resources. A combination of zero-based budgets with rolling budgets or some other form of budgeting that spreads the work of justifying new budgets each cycle is one way to incorporate zero-based budgeting without undo stress at the same time for all managers with budgetary responsibility.

Kevin Nelson

Revised by Scott B. Droege

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ZERO SUM GAME

A zero-sum game is a term used in connection with game theory and management games. Game theory is a mathematical theory that applies to certain situations in which there are conflicts of interest

between two or more individuals or groups. Management games are training or educational activities utilizing game theory models consisting of work situations. A zero-sum game is one type of management game in which all the payoffs for all players total zero; what one player or group gains, the other loses.

To better understand the term zero-sum game, it is beneficial to analyze game theory, as well as management games. Game theory is a significant branch of operations research and is closely related to decision theory and operational gaming. It attempts to answer the question, In a situation of conflict, what choice should the player make?

Game theory deals with abstract models of conflict situations or games of strategy. A game occurs when an individual or teams of people are in competition either against one another or against situations, or both.

A game can be represented by the following model:

1. there are *n* players (*n* being a certain number), each of whom is required to make one choice from a specified set of possible choices;
2. when every player has made a choice, the particular combination of choices they have made determines an outcome that, in some way, affects or interests all players;
3. each player knows what outcome results from each possible combination of choices;
4. each player has an order of preference for the possible outcomes (often each player assigns to each outcome a numerical value, called a payoff, which can be thought of as representing the number of points, or dollars, etc., that he gains or loses from the outcome);
5. each player knows the preferences of the other players (she knows what their payoffs are) and all players are assumed to act so as to gain the most they can from the game; but
6. each player makes his choice without knowing what choice the other players are making.

In the game, the competing players are identified as *persons* whether they are individuals, teams, or any other group representing a single set of interests. A *play* of a game is an exercise of the conflict model according to the rules; it consists of one or more *moves* by each player and may involve moves left to chance. The outcome of the game is represented by the payoff, a gain or loss of some utility to each of the players as a result of the positions reached at the end of the game. The *solution* of a game is comprised of the identification from among all the possible alternative courses of action, which ensures the player's expected payoff at a quantity called the *value* of the game.

In a business scenario, for example, the competition between two companies may be structured in game-theory terms. The persons are the companies, the play can be a determined period of time; and the rules are the discipline of the marketplace. Within the rules, management may make a variety of decisions upon which actions may be taken. These are known as the moves.

The firm's master plan is the strategy. In this example, the strategies of the companies would describe the companies' general decisions on such topics as advertising, mergers, and new product lines. The results of the interactions among the strategic choices made by the two firms are manifested by the payoff, which could be chosen to be annual gross sales, net profits, and so on. Only when a situation such as this is structured and quantified is it meaningful to address a solution and value for the game. The theory is used to calculate the optimum strategy that maximizes the winnings or minimizes the losses of one or more of the players.

Finite games, those in which each player has available a finite number of strategies, may be categorized according to the number of persons, relationships among payoffs, and whether cooperation among the players is allowed. The simplest form is the two-person zero-sum game, zero-sum denoting that the sum of the payoffs to the two players is zero.

A payoff matrix can be arranged to identify the payoffs for each player. The matrix is expressed in terms of the payoff to A, whereas B's payoffs are the negative of A's, thus satisfying the condition that their sum be zero. Positive entries indicate payments by B to A; negative ones, payments by A to B.

The solution can take two forms; the pure strategy case, in which a single strategy will be indicated as optimal; or a mixed strategy case, in which two or more strategies appear along with the relative frequencies with which they must be employed. An example of a two-person zero-sum game given by Derek French and Heather Saward, showing a pure strategy solution, is presented in Exhibit 1.

Exhibit 1

Matrix of a Two-Person Zero-Sum Game

		B's Strategies		
		B_1	B_2	B_3
A's Strategies	A_1	0	-1	7
	A_2	2	3	8
	A_3	9	5	6
	A_4	10	4	-2
		10	5	8

A's problem is to choose one of his four strategies; while B's is to choose one of his three. For example, the choices of A2 and B2 result in the payment by B to A of three units, while A4 and B3 lead to the payment by A to B of two units. First, consider A's analysis of his problem: A1 is a weak strategy because it nets A less than does the equally available strategy A2, regardless of B's choice. In this example, A1 is dominated by A2, and hence A1 from further consideration. By choosing A4 in an effort to realize the payoff of ten units at A4 and B1 could result in the loss of two units if B selects B3; similar dilemmas exist for the other choices.

Suppose that A takes a conservative point of view and examines the least his choice could produce; a gain of two for A2, a gain of five for A3, and a loss of two for A4. Of these options, A3 and its consequence appear the best choice; the five-unit gain represents an assured security level to A since he cannot be driven below this point by any action taken by B. In essence, A has examined the minimum gain that each row strategy could produce and, striving to maximize his gain has selected the greatest of these.

This is referred to as A's maximum strategy (R3 in Exhibit 1). At this point, B analyzes the greatest loss he might sustain as a result of his strategy choice; ten units for B1, five units for B2, and eight units for B3. Of these choices, B2 causes the smallest loss on B and establishes his security level by guaranteeing that no action of A's can cause his loss to be above five.

Summarizing, B has identified the maximum loss that each column strategy could produce and, wanting to minimize his loss has selected the least of these; known as B's minimax strategy. The most important feature of this result is the independently arrived-at agreement on the part of the players as to their security levels. This example also possesses a saddle-point, an element that is concurrently the greatest of the row minima and the least of the column maxima. The significance lies in the fact that if either player deviates from this choice; it will result in either decreased gain or increased loss.

The solution is that A always employs A3, B always employs B2, and the value of the game is five. This, of course, is not a fair game since A always wins five units at each play. It can be made fair, however, by requiring A to pay five units to B each time to induce B to play, or by reducing each element of the game matrix by five.

In recent years there has been opportunity to watch game strategies being used on the reality television shows that place teams, and eventually individuals, against each other. While ultimately a zero-sum game (in the end, one person wins everything), successful participants employed various strategies to cooperate with and exploit each other, all in an effort to win.

Although the most notorious use of game theory was utilized by the armed services in the Vietnam War for strategic purposes, the theory is noted today for its potential contribution to industrial affairs. Game theory is used to analyze economic policies and international agreements (e.g., whether economic sanctions act as practical incentives or build additional resentment). It is applied in management games, in which managers are grouped into teams representing a manager or the management of one of several competing organizations. The manager must take a sequence of decisions relating to a simulation of a real-life management problem, and is then presented with the results of each decision after it is made.

In the game, the result of an individual decision is the response, or the next move, of the other competitors. The games are used for several training purposes. They provide experience and they bring rapid feedback on the results of a decision. They also can show cause-and-effect relationships that may be blurred during longer time periods in real-life situations. The end result is to attain more personal involvement, greater attention, and greater retention of new concepts and ideas that have been acquired.

SEE ALSO: Decision Making

Kevin Nelson
Revised by Wendy H. Mason

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