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Knowledge Management

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Low-cost Automation

Malcolm Baldrige National Quality Award

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National Quality Awards

Natural Farming

Nature Farming

Niche Agricultural Marketing

Niche Marketing

OHSAS 18000

One Tambon, One Product (OTOP) Project

One Village, One Product (OVOP) Movement

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Participatory Irrigation Management

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Preventive and productive maintenance (PPM)

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Project Cycle Management (PCM)

Quality Auditor

Quality Management System (QMS)

Responsible Care

Risk

Risk Management

Rural Rapid Appraisal/Participatory Rural Appraisal

Sanitary and Phytosanitary Measures

Six Sigma

Social Capital

Statistical process control (SPC)

Sustainable Agriculture

SWOT Analysis

Taguchi method

Total Factor Productivity

Total Quality Management

Toyota Production System

3Rs: Reduce, recycle, and reuse

These activities are the basis for reducing waste and process optimization. Reduce means using fewer inputs including raw materials and energy so that the pressure on environment will be less. This also leads to the production of less waste. Recycle means returning part of the waste stream to the system, either to be used for the same type of product for which it was originally manufactured, or to be remanufactured into something new. Reuse means returning a part of the waste stream of a product to be used repeatedly for the same purpose.

The 3Rs can be more than just an activity or a program; they can become a corporate philosophy shared by every member of the organization. This will not only lead to improved productivity and environmental indices, but also help create a better working environment.

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5S or Good Housekeeping

5S or good housekeeping involves the principle of waste elimination through workplace organization. 5S was derived from the Japanese words *seiri*, *seiton*, *seiso*, *seiketsu*, and *shitsuke*. In English, they can be roughly translated as sort, set in order, clean, standardize, and sustain. The cornerstone of 5S is that untidy, cluttered work areas are not productive. As well as the physical implications of junk getting in everybody's way and dirt compromising quality, we all are happier in a clean and tidy environment and hence more inclined to work hard with due care and attention. Thus, 5S and good housekeeping are core elements of "lean thinking" and a "visual workplace" and are a fundamental platform for world-class manufacturing.

5S provides the foundation for all quality improvement programs. Thus, it is often said that the road to productivity starts with 5S and through 5S you can create a highly productive company with highly productive people. 5S is not only a matter of good

housekeeping. It is a process to create more productive people and more productive companies through motivation, education, and the practice of 5S. It involves the creation of a strong corporate culture filled with the spirit filled with the spirit of high productivity.

Seiri Sorting/Putting things in order (remove/discard what is not needed so that there are fewer hazards and less clutter to interfere with work. Only keep what is needed.)

Seiton Orderliness/Proper Arrangement (Place things in such a way that they can be easily reached whenever they are needed. "There must be a place for everything, and everything must be in its place.")

Seiso Clean/cleanliness. (Keep workplace and things clean and polished; no trash or dirt in the workplace)

Seiketsu Standardize/Purity (Maintain cleanliness after cleaning, consistently- perpetual cleaning. Such cleaning is part of every one's work.)

Shitsuke Sustaining/discipline/commitment (Maintaining standards and keeping the facility in safe and efficient order day after day, year after year.)

See also: Kaizen; Toyota Production System; Lean Production System

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7 Wastes

A waste is an activity that does not add any value to the product or service. This is one of the ways in which organizations waste or lose money, as the customer certainly does not need it and will not pay for it! Mr. Taiichi Ohno, Toyota's engineer, came up with 7 categories of wastes which cover all the ways in which manufacturing organizations waste money. These 7 wastes (called *muda* in Japanese) are: waiting, transporting, processing, Inventory, Motions, defects/rework & Overproduction, as explained below:

Waiting
Waiting is one form of waste that is all too familiar. We encounter it everywhere. For example: waiting for a machine that has broken down; delay in arrival of materials; or someone being late for a meeting. The cause may often be bad planning, bad organization, lack of proper training, lack of control, or laziness and lack of discipline.

Transporting
Transporting or moving things from one place to another is a common form of waste, since it does not add to the value of products. Hence, it should be eliminated or reduced as much as possible. There are two aspects to be considered: eliminating the need for

transport by better layout; and improving the method of transport.

Processing
Processing waste is inherent in the process or design itself. For example, an electronic typewriter has fewer parts and processes than a mechanical typewriter. Replacing a metal dustbin with a plastic one can reduce several steps in the production process. Using preprinted forms can save a lot of paperwork. Unnecessary processing and procedures is also a waste.

Inventory
When excessive inventory is carried, it ties up valuable financial resources and may deteriorate over time. It also takes up space in the factory. Likewise, the work in process (WIP), and finished stocks are also a waste.

Motions
Movement of equipment or people add no value to the product. All physical work can be broken down into basic motions. Motion study is one aspect of industrial engineering that assists us to reduce wasted motions. Usually this is done by improving the workplace layout, practicing good housekeeping and workplace organization, and introducing jigs and fixtures and low cost automation.

Defects
Waste caused by producing poor-quality products and defective parts or poor service is another common form of waste. Time is often spent in reworking poor products or addressing customer complaints. Last-minute urgent requirements may disrupt systems and cause delays in delivery to customers. Sometimes poor quality can cause accidents.

Overproduction
Often manufacturing produces more than actually is needed or was ordered. The unused products may have to be discarded when not required at a later stage. This is very costly. Overproduction is caused by poor planning, poor forecasting, producing too early, and lack of quality control.

Other kinds of wastes categorized of late include:
- Untapped human potential
- Inappropriate systems
- Energy and water

See also: Toyota Production System; Lean Production System

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Agribusiness

Agribusiness encompasses all operations involved in the manufacture and distribution of farm supplies (seed, agrichemicals, farm machinery, etc); production on the farm (land cultivation, crop/animal husbandry, etc); and post-harvest management (storage, processing, packaging, transportation, and distribution of farm commodities and products made from them). Agribusiness also includes agroindustry as a subset.

See also: Agroindustry

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Agroindustry

An industry that processes materials from primary agricultural/animal production, forestry and fishery (the processing can include transformation and preservation through physical or chemical alterations, storage, packing, and distribution) can be considered as an agro-industry. Thus, agroindustry can be thought of simply as a subset of agribusiness and is synonymous with agro-processing industry, or agri-based industry. However, it does not include operations and services dealing with the manufacturing and distribution of farm supplies; production operations on the farm; and the provision of services such as agricultural extension.

See also: Agribusiness

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Agrotourism

Agrotourism (also known as farm tourism, agritourism, rural tourism, nature tourism, and green tourism) generally refers to visitor-oriented, value-added farm/ranch enterprises, operated singly or as part of a package of activities to provide enjoyment and education or other experiences or services to visitors which can generate additional income in addition to products produced by the farm/ranch. In agrotourism, visitors have the opportunity to become acquainted with agricultural areas, farming activities, local farm-based products, traditional cuisine, and the daily life of the people, as well as cultural elements and authentic features of the area. At the same time, it mobilizes the productive, cultural, and developmental forces of an area, contributing in this way to the sustainable environmental, economic, and social development of rural areas. For example, green tourism in Japan puts an emphasis on farming and rural cultural experiences, which have educational effects as people come to understand farming and rural heritage.

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Alternative Dispute Resolution

Alternative dispute resolution (ADR) is informal litigation channels for dispute or complaint resolution. They consist of process entailing arbitration, conciliation, mediation, political lobbying, and reconciliation. As prescribed by the UN's New York Convention in 1958, ADR is a more efficient practice of dispute resolution excluding the court system, while promoting a free flow of social exchange in all areas of vocation not limited by legal, national, or geopolitical frameworks.

See also: Arbitration Process

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Aquaculture

Aquaculture is the raising and harvesting of fresh- and saltwater plants and animals. The most economically important form of aquaculture is fish farming, an industry that accounts for an ever-increasing share of world fishery production. Formerly a business for small farms, it is now also pursued by large agribusinesses, and by the early 2000s it had become almost as significant a source of fish as wild fisheries. Common products of aquaculture are catfish, tilapia (St. Peter's fish), trout, crawfish, oysters, shrimp, and salmon, and tropical fish for aquariums. Some are raised in huge freshwater tanks or ponds; others require the running water of rivers or streams. Saltwater species are often raised in saltwater ponds, in enclosed bays, or in pens placed in coastal or deeper sea waters.

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Arbitration Process

Arbitration refers to an out-of-court settlement process through an arbitration tribunal. Decisions reached by the tribunal is considered absolute and enforceable. Both parties in an arbitration proceeding are not on trial for judgment (right or wrong) but are pursuing mutual conciliation that is usually more amicable than a court judgment.

See also: Alternative Dispute Resolution

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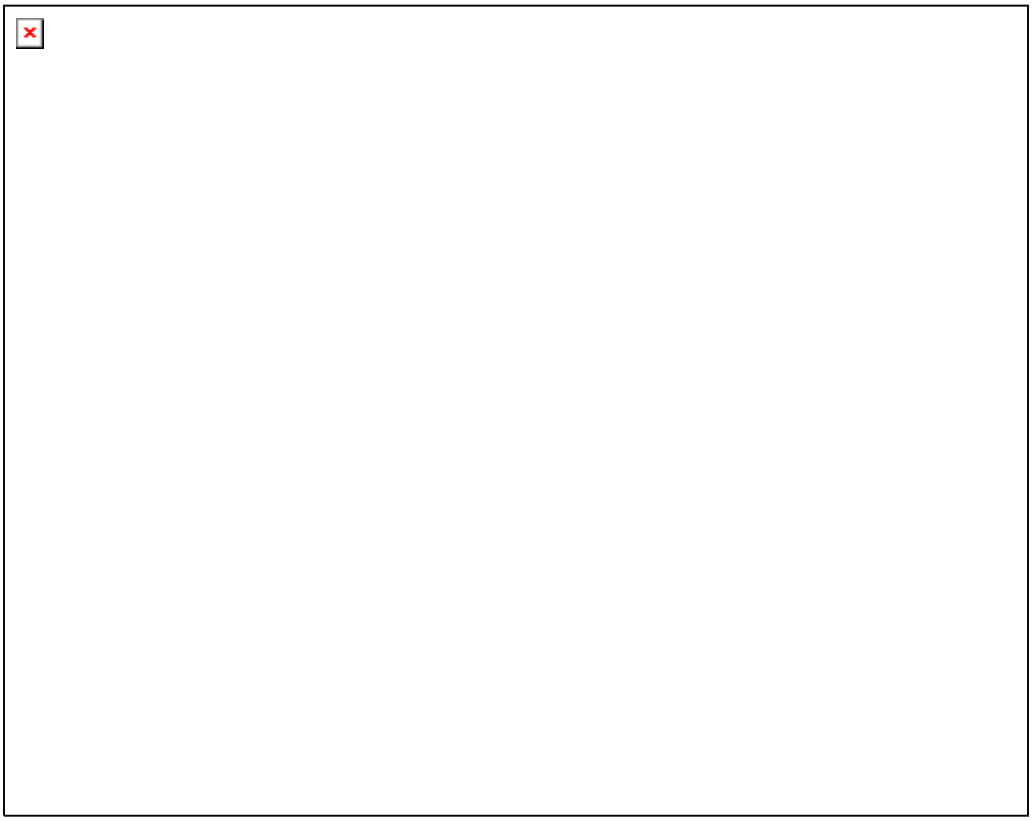
Balanced Scorecard

The Balanced Scorecard (BSC) is an approach to performance measurement that was introduced by Dr. Robert Kaplan and Dr. David Norton of Havard Business School in 1992. The approach combines traditional financial measures with non-financial measures that drive business outcomes, so that organizations focus on the future and act in their long-term best interest. This way managers are provided with better and more relevant information about the activities they are managing, increasing the likelihood of organisational objectives and vision and mission being achieved. The BSC approach also involve a strategic management system which enables managers to focus on the important performance metrics that drive success, and balances the financial perspective with customer, process, and employee perspectives. Measures are often indicators of future performance. The BSC was intended to help overcome some of the weaknesses of previous management approaches, and provide clear prescription as to what companies should measure in order to link individual, department, and overall performance to company's strategy.

Kaplan and Norton suggest that we view the organization from fourperspectives, and to develop metrics, collect data and analyze it relative to each of these perspectives. The four perspectives of the BSC can be seen below:



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Benchmarking

Benchmarking is essentially a business excellence tool for finding, adapting, and implementing leading practices to achieve superior performance. It is a powerful performance management tool that can be used to generate both incremental change and wide-ranging strategic reform. Benchmarking is a learning process in which information, knowledge, and experience about leading practices are shared through partnerships between organizations. It allows an organization to compare itself with others and, in the process, step back from itself and reflect. Comparative measurement through benchmarks helps to identify problems and opportunities and also tests hypotheses and "gut" feelings about performance. Benchmarking offers an organization an opportunity to change and to improve.

Benchmarking aims to examine, compare, and improve performance of processes used in business operations (frequently processes are generic); may examine process flow, efficiency, effectiveness, adaptability, cycle time, or cost; is about sharing how things are done; requires a thorough understanding of one's own processes; and results in recommendations for change to improve performance. Benchmarking is not a single event. It is an ongoing process for finding improved ways of doing things linked to the mission, vision, and values of the organization. Once desired benchmark levels are identified and the organization applies learning from partners to adapt and improve the targeted processes, it is important to understand that in time benchmark levels will rise and there will be a need to monitor process outcome performance to determine potential opportunities to improve as compared with partners with better performance.

Benchmarking will tell you how well you are performing, how good you need to be (it will give a practical vision), how to get there (a roadmap), and therefore help you to achieve your mission, vision, and goals. Benchmarking is not a program, cookbook process looking only at ingredients or numbers, fad, mechanism for resource reductions, organizational tourism, adopting or copying, or method for catching up.

See also: Best Practices

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Best Practices

Best Practice is considered as a business buzzword used to describe the process of

developing and following a standard way of doing things that organizations can use for management, policy, and operation. According to Wikipedia, it is a management idea which maintains that there is a technique, method, process, activity, incentive or reward that is more effective at delivering a particular outcome than any other technique, method, process, etc. The notion of 'best practices' does not commit people or companies to one inflexible, unchanging practice. Instead, Best Practices is an approach based around continuous learning and continual improvement. The APQC defines best practices as "those practices that have been shown to produce superior results, selected by a systematic process, and judged as exemplary, good, or successfully demonstrated".In short, best practices refer to proven methods that have contributed to superior performance or best meeting customer requirements. The word gbest h is a relative term. It is a moving target and is also situation specific. There is no single type of best practices because best is not best for every organization. Each organization is different in some ways in terms of its mission, culture, factors affecting its business, and stage of development. Hence, an organization needs to assess whether a practice is significantly better than what currently exists in the organization and, if adapted and implemented, would produce superior results or performance. A best practice is any practice that works best for you to improve your situation.

See also: Benchmarking

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Biofuel Crops

Biofuel (bioethanol, biodiesel, biogas, etc) is produced from renewable biological resources such as plant biomass, animal waste, and treated municipal and industrial waste. Crops used for the production of biofuels are called biofuel crops. At present, food crops like maize, rapeseed, canola, and soybeans are used for the production of biofuels. In Brazil, ethanol is extracted directly from sugarcane. Brazil has recently announced a new biodiesel called H-Bio that is a mixture of cottonseeds, castorbeans, sunflower seeds, and soybeans. India is promoting Jatropha (*Jatropha curcas*) plantation for the production of biodiesel. Palm is another source of biofuel. Algae can provide many times over the amount of oil from the highest producing crops, palm and jatroba, with the advantage that they can be cultivated in salty ponds in conjunction with carbon power plants to capture their CO2 emissions. Biodiesel crops should preferably target land that is less favorable for food crop production such as marginal land, salt-affected land, wasteland, etc. to avoid unwarranted competition with food production.

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Biomass

Biomass means organic resources from renewable biological origins, excluding fossil resources. In energy production and industry, biomass refers to living and recently living biological material that can be used as fuel or for industrial production. Most commonly, biomass refers to plant matter grown for use as biofuel, but also includes plant or animal matter used for the production of fibers, chemicals, or heat. It excludes organic material that has been transformed by geological processes into substances such as coal or petroleum. It is usually measured by dry weight.

Biomass was the main energy source for humans until the 19th century. In the 20th century, biomass was replaced by oil and coal, and then by natural gas and atomic energy. The reasons why biomass energy is currently receiving attention are mainly related to biomass characteristics. Biomass is renewable, available in vast reserves, carbon neutral, storable, and can substitute for oil.

See also: Biofuel Crops

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Biopharming

Biopharming is the growing of plants to produce pharmaceutical substances that could provide a cost-effective and abundant source of drugs. It is considered an alternative production system, whereby plants are grown to serve as pharmaceutical factories. The process involves engineering of plants with genes to produced the desired substances. Crop-produced drugs could cut costs dramatically over the current costs of laboratory-produced drugs.

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Brainstorming

Brainstorming is a common method used to generate ideas on causes of and possible solutions to any topic or process problems. A brainstorming session usually involves a group of people getting together and listing ideas in a process that is free of criticism and judgment. Analysis and commentary on ideas are delayed until after the brainstorming

session has concluded. Brainstorming encourages open thinking and gets all team members involved so that only a few do not dominate the whole group. Brainstorming also allows team members to build on each other's creativity while staying focused on their joint mission. Brainstorming can be structured, where each team member gives ideas in turn, or unstructured, implying that team members can give ideas as they come to mind.

See also: Fishbone Diagram

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Business Excellence Awards

Business excellence awards are similar to and sometimes used interchangeably with national quality awards. In some cases, business excellence awards are used to engage the private sector fully, because profit and commercial success are more important concerns than organizational performance excellence. Such awards recognize business enterprises with excellent records or consistency in gaining competitive advantages.

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Business process reengineering (BPR)

Reengineering is about radical change. Business process reengineering (BPR) differs from continuous (incremental) improvement programs that place emphasis on small, gradual changes, of which the object is to improve on what an organization is already doing. This incremental change to improve business performance typically takes one of several forms, e.g., quality (total quality management), automation, reorganization, downsizing, and rightsizing. In contrast, BPR is:

1. Not just automation, although it often uses technology in creative and innovation ways.
2. Not just reorganization, although it almost always requires organizational change.
3. Not just downsizing, although it usually improves productivity.
4. Not just quality, although it is almost always focused on customer satisfaction and processes that support it.

BPR is a balanced approach that may contain elements of more traditional improvement programs with which it is often confused. However, BPR is much more than that. First, BPR seeks breakthroughs in important measures of performance rather than incremental improvements. Second, BPR pursues multifaceted improvement goals, including quality,

cost, flexibility, and speed, accuracy, and customer satisfaction concurrently.

To accomplish these outcomes, BPR adopts a process perspective of the business, while other programs retain functional (departmental) perspectives. It also involves a willingness to rethink how work should be done, even if it means totally discarding current practices if that should prove necessary. BPR also takes a holistic approach to business improvement, leveraging technology and empowering people, which encompasses both the technical aspects of process (technology, standards, procedures, systems, and controls) and other social aspects (organization, staffing, policies, jobs, career paths, and incentives) (adapted from Manganelli R.L. and Klein M.M., The Reengineering Handbook, 1994).

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Checklists

A checklist is a set of questions or verification points (checkpoints) that an organization needs to monitor or address on a periodic basis. The categories on a checklist can include such issues as maintenance, compliance either with legislation or with internal codes of practice, equipment checks (pressure, temperature, etc.), availability of equipment, etc.

Checklists are useful aids to jog memory. They also can reduce variations between evaluations conducted by different members of the productivity/project team. This prevents the team from forgetting issues that need to be verified.

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Codex Alimentarius

The Codex Alimentarius (CA) means "food code." It deals with food quality and safety in the context of international trade. The CA is a collection of international food standards mainly to protect the health of consumers. It is meant to contribute to fair practices in international food trade through widespread adherence to harmonized and science-based food standards, as well as other legitimate factors. The Codex Alimentarius Commission (CAC) is the body responsible for developing the CA. It was established in 1961 by the FAO and WHO. The CAC is an intergovernmental body served by a joint FAO/WHO Secretariat.

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Contract Farming

Contracting farming is an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices.

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Corporate Environment Policy

Corporate Environmental Policy (CEP) is a commitment of a business to environmental excellence as a part of corporate mission and vision. CEP accepts the guiding principles of precautionary approach, polluter pays and accountability. It enables the adoption of practical measures, ensures transparency, and must include environment in corporate training schemes. CEP is a requirement of most voluntary initiatives, codes of conduct and international voluntary standards, such as Responsible Care and ISO 14000.

See also: Corporate Environmental Responsibility; Corporate Environmental Reporting

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Corporate Environmental Reporting

Closely linked to Corporate Environmental Policy is Corporate Environmental Reporting (CER). The CER is a voluntary disclosure of environmental performance by companies. It serves as a vehicle for greater accountability to stakeholders and as a catalyst for internal change by acting as a benchmarking tool. It also serves as a catalyst for the evolution of internal management systems, improvement of performance, and the emergence of new forms of accountability.

See also: Corporate Environmental Responsibility; Corporate Environment Policy

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Corporate Environmental Responsibility

Corporate Environmental Responsibility (CER) is demonstrated by continuing commitment by industry to act in environment-friendly manner and contribute to overall environmental improvement while carrying out its business. The CER is ascertained

based on principles of sustainable development which centers on decision making process in industry that takes into consideration all related environmental aspects keeping in mind immediate and long-term environmental impacts of their activities. The CER makes industries think beyond just regulatory compliance.

Recently organizations are taking CER as a part of their corporate social responsibility.

See also: Corporate Environmental Policy; Corporate Environmental Reporting; Corporate Social Responsibility

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Corporate Social Responsibility

Corporate Social Responsibility (CSR) is a concept that organizations have an obligation to consider not only the interests of customers, employees, and shareholders, but also of the society, communities, and environment in all aspects of their operations. This obligation is seen to extend beyond their statutory obligation to comply with legislation. The responsibility is stemming from the fact that business and society are interdependent. The wellbeing of one depends on the wellbeing on the other. Many organizations are now taking their corporate environment responsibility as a part of their corporate social responsibility and include corporate environmental reporting in their CSR reporting as well.

The World Business Council for Sustainable Development in its publication "Making Good Business Sense used the following definition. "Corporate Social Responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large".

See also: Corporate Environmental Responsibility; Corporate Environmental Reporting

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Creative Entrepreneurship

Entrepreneurship is the practice of starting new organizations, especially new businesses, generally in response to opportunities. Creative entrepreneurship focuses on the process of creating new and/or different business, products, services, and processes to create wealth and add value. The spheres of creative entrepreneurship can be summarized as follows:

Who new ventures, serial entrepreneurs, existing ventures by themselves, existing ventures with others, regions, and networks

What new products/services based on innovations or technology, new markets, new processes, or new business models.

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Decision Matrix

A decision matrix (also called selection matrix, problem matrix, etc.) evaluates and prioritizes a list of options. The team first establishes a list of weighted criteria and then evaluates each option against those criteria. It is also a tool that helps convert qualitative data into quantitative data using evaluation criteria. Often decisions must be based on qualitative data that are difficult to analyze. These data are also normally shaded by personal impressions and feelings, so the discussion about best options is sometimes influenced by personal bias rather than strategic choices. With a decision matrix, everyone can participate in a process that leads to a group decision with quantitatively compared data.

To develop a decision matrix:

1. All the options must be identified.
2. Criteria to be used must be decided.
3. A scale or a weight for all the criteria must be selected.
4. Every option in accordance with the criteria and scale must be evaluated and the best option chosen.

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Eco-mapping

Eco-mapping is a visual process to identify the environmental aspects in a plant or industry quickly and simply. An eco-map is a reference to the diagram that uses the plant layout to express graphically the locations where attention must be given to improve production or environmental performance.

Eco-maps are useful because they permit a fast, highly visual understanding of where the major problems are within an organization. They do not require significant training to use

and can be implemented in a day. This way, more energy can be spent on problem solving rather than on problem identification.

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Ecodesign

Ecodesign is a method of designing products that takes into account their impact on the environment at all stages of their life cycle. This means attempting to lower the environmental impact and improve the performance of products. The life cycle of a product is usually divided into procurement, manufacture, use and disposal. Thus Ecodesign includes the environmental objectives as very important, and these are treated as major design objectives to be achieved. Ecodesign may for example result in the choice of a recyclable or biodegradable material for packaging or the development of a washing powder effective in cold water to reduce the energy consumption of washing machines.

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Ecoefficiency

Ecoefficiency in resource utilization to produce the same level of goods/services was introduced by the World Business Council of Sustainable Development in 1992. It reflects the issue of sustainability of resource utilization in manufacturing. Ecoefficiency is achieved by the delivery of competitively priced goods and services that satisfy human needs and improve the quality of life while progressively reducing ecological impacts and resource intensity throughout the life cycle to a level in line with the earth's estimated carrying capacity.

See also: Ecosustainability

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Ecological footprint

An ecological footprint refers to the land and water area that is required to support a defined human population and their material standard indefinitely, using prevailing technology. While first developed as a planning tool for communities, refinements are being made to apply this to single organizations and individuals. It accounts for the size and effect of the impact, i.e., "footprints," on the earth's ecosystems made by an

organization. It is a simple way to represent relative sustainability based on a number of complex interlinked factors such as human population numbers, consumption patterns, and technologies used.

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Economies of Scale

Economies of scale refer to the utilization of an asset to produce more of a single output, and the unit cost of increased volume of products or services declines as customer demand increases. Mass production is an example leading to economies of scale.

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Economies of Scope

Economies of scope refer to the utilization of an asset to produce different types of outputs and through the increase in outputs produced using the same asset, the unit cost declines. Modular platform systems are an example.

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Economies of Span

Economies of span refer to the efficient coordination or sequenced utilization of assets and through the decreased transaction costs between the stages of production, the unit cost declines. Control and logistical systems are examples.

Top

Economies of Speed

Economies of speed refer to the utilization of an asset to produce outputs at a higher rate of throughput and through a decrease in the time required to produce outputs, the unit cost declines. Parallel computing systems are an example.

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Ecosustainability

The principle of ecosustainability, like ecoefficiency, recognizes the finiteness of natural resources and the need to utilize them efficiently. The core concepts of the principle of ecosustainability are:

- No adverse long-term effects on ecosystems.
- Rate of the use of natural resources is less than the rate of renewal of the resources.
- Growth is within the carrying capacity of the environment.

See also: Ecoefficiency

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Energy Conservation

Energy Conservation is a series of activities/programs, designed to prevent, mitigate and correct energy leaks or loss throughout an organization. These activities include among others: i) Energy Conversion: avoiding energy loss during energy transfer operation, ii) Transfer: reducing unwanted energy transfer (e.g. irradiated heart) or re-designing to benefit from energy transfer (e.g. steam recovery), iii) Energy Utilization: improving the efficiency with which energy is used and how it should be used, and iv) Energy Recovery: using energy from waste streams (potential or actual) to feed other processes.

Energy conservation at a facility or during a process is possible in the following ways. First, in energy conversion, the focus is on the efficiency of industrial boilers, power reactors, etc., that convert fuel to steam or fuel to electricity. Second, when energy is transferred from the point where it is generated to the point where it is used, there may be losses. The energy transfer efficiency of the energy conduits and steam piping can contribute significantly to reduce losses during energy transfer. Third, energy utilization refers to the actual end use of energy in a process. The individual equipment efficiency in terms of unit product output per unit of energy utilized is the focus. Fourth, energy can be effectively recovered and recycled back to processes. Sometimes, hot effluents are discharged to treatment plants. If heat exchangers are employed to draw off the excess heat in the effluent, it can be used in the process again. Sometimes, the material in waste or by-products has high calorific value and can be used as a secondary energy source.

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Environmental management system (EMS)

An environmental management system (EMS) is a set of processes and practices which enables an organization to reduce its environmental impacts and increase its operating efficiency. In other words, the EMS is the part of the overall management system that addresses the impact of an organization's activities, products, and services on the environment.

EMS are often based on the plan, do, check, act (PDCA) model. The ISO14000 series of standards are the world's most widely recognized for a systematic approach to environmental management.

See also: ISO14000; PDCA Cycle

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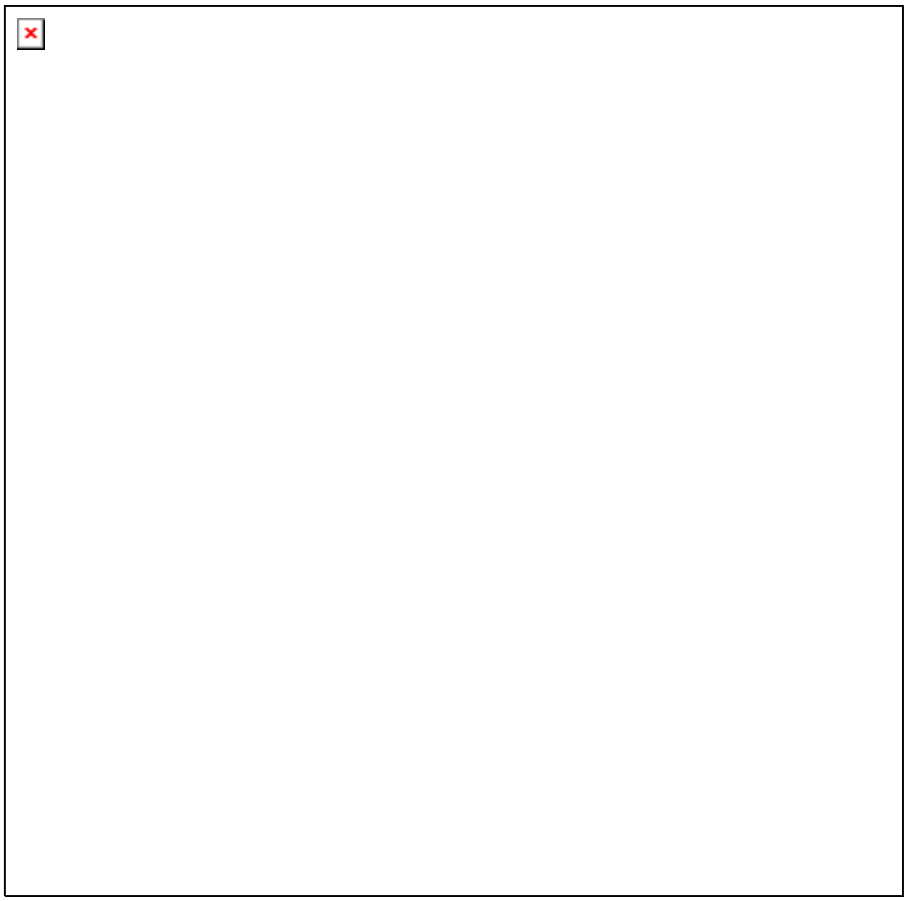
Fishbone Diagram

Dr. Kaoru Ishikawa, a Japanese quality control statistician, invented the fishbone diagram. It is often also referred to as the Ishikawa diagram. The fishbone diagram is an analysis tool that provides a systematic way of looking at effects and the causes that create or contribute to those effects. Because of the function of the fishbone diagram, it may be referred to as a cause-and-effect diagram. The design of the diagram looks much like the skeleton of a fish. Therefore, it is often referred to as the fishbone diagram. A cause-and-effect diagram can help identify the reasons why a process goes out of control. Often the fishbone diagram can be used to summarize the results of a brainstorming session, identifying the causes of a specified undesirable outcome. It helps to identify root causes and ensures a common understanding of the causes.

Cause-and-effect relationships govern everything that happens and as such are the path to effective problem solving. By knowing the causes, we can find some that are within our control and then change or modify them to meet our goals and objectives. By understanding the nature of the cause-and-effect principle, we can draw a diagram to help us solve everyday problems every time. Below is an example of use of Ishikawa Diagram to solve a difficulty on locating a drawing.



See also: Brainstorming

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Food Chain Approach

The food chain approach is a holistic method to ensure food safety along the entire food chain. This approach requires all actors in the food chain to recognize that primary responsibility lies with all those who produce, process, and trade in food. It covers the food chain from field (primary production) to fork (final consumption). The responsible persons include farmers/producers, fishers, slaughterhouse operators, food processors, transport operators, and distributors (wholesale and retail). In this approach, the relevant information regarding the safety of food should be provided to the next party in the food chain.

The food chain approach to food safety varies from the traditional model where the responsibility for food safety tended to concentrate mainly on the food-processing sector. This approach is meant to ensure the production and supply of safe food products.

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Good Agricultural Practices

Good agricultural practices (GAP) refers to the package of recommendations and available knowledge to address environmental, economic, and social sustainability for on-farm production and postproduction processes resulting in safe and healthy food and nonfood agricultural products. The adoption of GAP will ensure a clean, safe working environment for employees while eliminating the potential contamination of food products. GAP may consist of guidelines addressing the issues of site selection, adjacent land use, fertilizer use, water sourcing and use, pest control and pesticide monitoring, harvesting practices (including worker hygiene, packaging, storage, field sanitation, and product transportation), and cooler operations.

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Green Productivity

Green Productivity (GP) is a concept that evolved to address the growing concern of consumers and stakeholders of business communities. Alarm by ever increasing negative impacts of development activities on environment, various quarters of the society has started demanding environment friendly goods, processes, and services. To address such a need of the society, the APO has put forward the concept of GP which basically brings forward the green aspect of Productivity. Green Productivity (GP) is a strategy for enhancing productivity while improving environmental performance of an organization. It is the application of appropriate productivity and environmental management tools, techniques, and technologies to reduce the environmental impact of organization fs activities, goods and services. In other words, GP aims to ensure environmental protection while making business profitable. GP recognizes that environment and development are two sides of the same coin. Extending this recognition, the concept of GP shows that for any development strategy to be sustainable it needs to have a focus on Quality, Profitability and Environment-called the Triple focus of GP.

GP is characterized by four distinguishing elements: i) Environmental Compliance, ii) Productivity Improvement, iii) Integrated People-based Approach, and iv) Information-driven Improvement. GP methodology is behind a successful GP implementation. GP methodology consists of six major steps. A step can be completed by following certain tasks. The six steps of GP methodology consist of thirteen tasks. These tasks could be accomplished by using varieties of GP tools such as Checklists, Material balance, Pareto charts etc. in combination with GP techniques such as 5S, 3Rs etc.

See also: Green Productivity (GP) methodology

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Green Productivity (GP) methodology

Green Productivity (GP) methodology consists of six major steps (success in six). Each step can be completed by following specified tasks, of which there are 13:

Step 1: Getting started
Task 2: Walk-through survey and information collection

Step 2: Planning
Task 3: Identification of problems and causes
Task 4: Setting objectives and targets

Step 3: Generation, evaluation, and prioritization of GP options
Task 5: Generation of GP options
Task 6: Screening, evaluation, and prioritization of GP options

Step 4: Implementation of GP options
Task 7: Formulation of GP implementation plan
Task 8: Implementation of selected options
Task 9: Training, awareness building, and developing competence

Step 5: Monitoring and review
Task 10: Monitoring and evaluation of results
Task 11: Management review

Step 6: Sustaining GP
Task 12: Incorporating changes into organizational system of management
Task 13: Identifying new/additional problem areas for continuous improvement

The methodology can be applied both in profit-making as well as nonprofit organizations. It has been found useful in community development projects as well.

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Green Purchasing

Green purchasing is the establishment of purchasing policies within an organization to ensure that purchasing decisions include environmental factors as one of the deciding criteria. Green purchasing makes use of environment-related information on the products

and services that an organization wishes to acquire. Life cycle assessment information is particularly helpful in establishing green purchasing practices.

See also: Life Cycle Analysis

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Hazard Analysis and Critical Control Point

Hazard analysis and critical control point (HACCP) is a proactive food safety concept. This systematic method serves as the foundation for assuring food safety in an era of globalization and trade liberalization. HACCP is designed to prevent the occurrence of food-borne hazards from production through the processing, storage, and distribution of a food product. The HACCP method involves the identification of specific hazards throughout the entire process and focuses on preventive measures to assure the quality and safety of food. This includes analysis of raw material sources and uses, processing equipment, operating practices, packaging, and storage, together with marketing and conditions for intended use. There is less reliance on the traditional system of end-product testing, and food safety is built into the product from conception through development and distribution. In brief, the purpose of HACCP is to identify potential problems that could occur in an operation, consider each, and establish controls to minimize or prevent their occurrence.

See also: ISO22000

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Integrated Pest Management

Integrated pest management (IPM) is a decision support system for crop protection which focuses on long-term prevention or suppression of pest problems with minimum impact on human health, the environment, and non-target organisms. IPM takes into consideration all available pest control techniques and tactics (cultural, mechanical, biological, chemical) and integrates the appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically, socially, and environmentally justified. IPM emphasizes the growth of healthy crops for better productivity with the least possible disruption to agroecosystems and encourages natural pest control mechanisms. It can be an effective strategy to promote Green Productivity in agricultural and food products.

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Integrated Plant Nutrient Management

Integrated plant nutrient management (IPNM) is a holistic, integrated approach that considers all the available farm resources that can be used as plant nutrients. The main principles of IPNM are to maximize the use of organic inputs while minimizing nutrient losses and to make supplementary use of chemical fertilizers. Good practices for IPNM often involve a combination of organic and inorganic sources of nutrients. Organic materials maintain and improve soil productivity, whereas chemical fertilizers are often needed if production is to increase. IPNM contributes to better farm waste management, minimizing environmental pollution, improving soil productivity, and the production of safe food and feed.

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Integrated Production Systems

Integrated production systems involve the horizontal and vertical integration of crops, livestock, trees, and aquaculture. The objective is to optimize the use of natural resources (land, soil, water, etc.) and agricultural inputs (seed, fertilizer, pesticides, etc.) to arrest land degradation as well as conserve and improve soil fertility/productivity, provide for the diversified needs of the producers, and enhance farm incomes, with the overall objective of conservation and improvement of the environment through the adoption of good agricultural practices. Integrated production systems aim to achieve sustainability in agriculture through the optimal use of natural resources and agricultural inputs, better waste management, conservation of biodiversity, and meeting diversified needs of rural communities, especially farming families.

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Ishikawa Diagram

Please refer to Fishbone Diagram

See also: Fishbone Diagram

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ISO

The International Organization for Standardization (ISO) is an international standard-setting body based in Switzerland, comprising representatives from various national standards bodies. The Organization was established in 1947, to develop common international standards in many areas. There are over 158 members of the ISO. ISO's main products are the International Standards, but the ISO also creates Technical Reports, Technical Specifications, Publicly Available Specifications, Technical Corrigenda, and Guides. Among the several standards produced by ISO are the ISO9000 and ISO14000 family of standards, and of late the ISO22000 which are explained below.

See also: ISO9000; ISO14000; ISO22000

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ISO14000

ISO 14000 is primarily concerned with the environment, or with what an organization does to manage the impact of its activities on the environment. ISO14000 is a series of environmental management standards developed by the ISO which provide requirements, guidelines, and tools for implementing an Environmental management System (EMS). It provides a standardized model for an EMS created through international consensus.

ISO14001 is the requirement standard of the ISO14000 series. Today, it is the most widely recognized standard for environmental management in the world. There are four ways to exhibit successful adoption of ISO14001: self-declaration; audit by an interested party such as a client; external audit; and obtaining certification/registration. As with other management system models developed by the ISO, the model is based on Deming's PDCA cycle for continual improvement.

See also: ISO; ISO9000; ISO22000

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ISO22000

Increasing consumer demand for safe food has led many companies to develop both food quality and food safety management systems based on the Hazard Analysis and Critical Control Point (HACCP). Food safety is the most important issue in the global food supply chain. To facilitate international trade in food, the International Organization for Standardization (ISO) published ISO 22000 in September 2005 for the certification of food safety management systems. The ISO developed this standard in close collaboration

with the food industry.

The ISO 22000 standard is a generic food safety management standard. It defines a set of food safety management system requirements. It is an internationally recognized standard that aims to improve food safety by harmonizing the requirements for food safety management throughout the food supply chain. It covers all organizations in the food chain from farmers to catering, including packaging. ISO22000 is a guidance standard describing the requirements of a food safety management system. It is also an auditable standard and can be used for certification and registration. ISO 22000 can be a useful business tool as it offers synergies to companies who have already implemented other ISO management systems. The standard can enable an organization to: a) plan, implement, operate, maintain and update a food safety management system, b) demonstrate compliance with applicable statutory and regulatory food safety requirements, c) evaluate and assess customer requirements relating to food safety, and d) effectively communicate food safety issues to their suppliers, customers and relevant interested parties in the food chain.

See also: ISO; ISO9000; ISO14000; Hazard Analysis and Critical Control Point

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ISO9000

ISO9000 is a family of standards for Quality Management Systems (QMS) developed by the International Organization for Standardization (ISO). It provides a standardized model for a quality management system (QMS), created through international consensus. ISO9001 is the specification standard in this series. ISO 9000 is primarily concerned with quality management. In simple English this means anything that affects a product or service required by a customer and what that organization does to ensure that a certain standard of quality is achieved and maintained.

An organization can self-declare its compliance with the requirements or obtain external validation, usually by third-party registration/certification. As with other management system models developed by the ISO, the model is based on Deming's PDCA cycle for continual improvement. Currently, more than half a million sites worldwide have obtained third-party ISO9001 certification. In some cases, customers require their suppliers to achieve this level of validation to remain in the supply chain.

See also: ISO; ISO14000; Productivity Management System

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Jidoka

Jidoka means "autonomation" with a human touch. The term is often used in association with a quality control process of the Toyota fs production system namely, lean manufacturing. *Jidoka* is one of the basic concepts of the Toyota Production System (TPS), whose main goal is to eliminate waste in the production system, with a view to streamlining the operation. Whilst being one of the tools for streamlining the operation, the concept of *Jidoka* proposes the importance of human elements and labour incentive of the workmen. Therefore, *Jidoka* is not merely about automation or mechanization, but "autonomation", with some human elements attached to it. For instance, mechanical operations are generally fraught with possible mistakes due to possible defection of machine, devoid of intelligence to detect and avoid it. Meanwhile, a machine can be said to be on *Jidoka*, if it is equipped with abilities and functions to detect and avoid such mechanical dysfunctions by itself. Hence, JIDOKA involves the automatic detection of errors or defects in the process of production.

See also: Just-in-Time; Toyota Production System

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Just-In-Time

Just in Time or JIT is one of important components of Toyota Production System. JIT is a production technology system which promotes economic efficiency, with a central principle of "produce appropriately what is necessary, just as much as needed, when needed". The main goal of JIT is to keep the stock at the necessary minimum during the production process, that is to say, a complete balance between order and production. Generally speaking, there are various production processes between receiving orders and shipment of products, and as a result, prolonged lead-time is often unavoidable. Prolonged lead-time can lead to opportunity loss especially for general mass produced products. JIT can be also understood as an inventory strategy for improving the return on investment of a business by reducing in-process inventory and its associated costs.

See also: Toyota Production System

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Kaizen

Kaizen is known as the single most important concept in Japanese management and it has been a key to the competitive success of Japanese manufacturing industries. *Kaizen* is a

Japanese word meaning "improvement," that calls for never-ending efforts to improve, inviting each and every one in the organization to take part. Problem-solving under the *kaizen* concept is seen as a cross-functional, systematic, and collaborative approach. It is a strategy that puts every member of the organization, from top management down, continuously on the watch for improvement options. This is done using systematic reviews and auditing procedures, brainstorming, and group decision tools to see where improvement opportunities may lie. All operations of the organization are subject to improvement, and the *kaizen* approach is that nothing has improved sufficiently to stop improving it.

Kaizen approaches employ various tools including 5S, quality control circles, total quality control, total preventive maintenance, just-in-time inventory, standard work, and automation, among others. These have all been useful in improving the three productivity dimensions of cost, quality, and speed. For example, the core concept of *kaizen* is to eliminate *muri* (overload), *muda* (waste), and *mura* (inconsistency) from the worksite through efficient utilization of labor, materials, and equipment.

See also: 5S or Good Housekeeping; Toyota Production System; Lean Production System

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Knowledge Management

Knowledge management (KM) refers to a range of practices used by organizations to identify, create, capture, and distribute knowledge for reuse, awareness, and learning across the organization. KM programs are usually linked to organizational objectives and are intended to lead to the achievement of specific outcomes, such as shared intelligence, improved performance, competitive advantage, or higher levels of innovation. The objective of KM is to make the best use of the knowledge assets available to an organization, turning them into a powerful driver for competitiveness. The rise of KM coincides with the emergence of the so-called knowledge-based economy. In the new economic era, traditional production factors such as land and capital are being replaced by the intangible asset of knowledge as the critical input for corporate competitiveness.

There are many schools of thought in the area of knowledge management. One of the most popular theories is proposed by Prof. Ikujiro Nonaka. As knowledge is intangible and essentially resides within individuals (as tacit knowledge), the challenge in KM is how to capture and harness individual-based knowledge to make it explicit and common knowledge for use across the entire organization. Prof. Nonaka argues that a successful KM program needs to convert internalized tacit knowledge into explicit (codified) knowledge to share it and make new knowledge and value for the organization.

An organization creates knowledge through the interactions between explicit knowledge and tacit knowledge. This interaction between the two types of knowledge is called "knowledge conversion.", through which both tacit and explicit knowledge expands in both quality and quantity. The four modes of knowledge conversion are: (1) socialization (from tacit knowledge to tacit knowledge); (2) externalization (from tacit knowledge to explicit knowledge); (3) combination (from explicit knowledge to explicit knowledge); and (4) internalization (from explicit knowledge to tacit knowledge). Prof. Nonaka states that Socialization is the process of converting new tacit knowledge through shared experiences, e.g. through spending time together, through apprenticeship, in informal social meetings outside the workplace, or beyond organizational boundaries, as often firms often acquire and take advantage of the tacit knowledge embedded in customers or suppliers by interacting with them.

Externalization is the process of articulating tacit knowledge as explicit knowledge, thus allowing it to be shared by others, and it becomes the basis of new knowledge. Combination is the process of converting explicit knowledge into more complex and systematic set of explicit knowledge so as to create new knowledge. Through Internalization, explicit knowledge created is shared throughout an organization and converted into tacit knowledge by individuals. Internalization is closely related to "learning by doing." Knowledge creation is a continuous process of dynamic interactions between tacit and explicit knowledge. Organizational knowledge creation is a never-ending process that upgrades itself continuously.

The Most Admired Knowledge Enterprises (MAKE) Award criteria examines eight key knowledge performance dimensions that are visible drivers of world-class knowledge organizations. These are:

- creating an enterprise knowledge-driven culture;
- developing knowledge workers through senior management leadership;
- delivering knowledge-based products/services/solutions;
- maximizing enterprise intellectual capital;
- creating an environment for collaborative knowledge sharing;
- creating a learning organization;
- delivering value based on customer knowledge; and
- transforming enterprise knowledge into shareholder value.

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Labor Productivity

Labor productivity is the value of goods and services produced in a period of time, divided by the hours of labor used to produce them. In other words labor productivity measures output produced per unit of labor, usually reported as output per hour worked or output per employed person. Increases in labor productivity are driven by technological change, improvements in efficiency, improvements in the quality of labor and capital deepening (where more capital is added to a given amount of labor). Most of the time, when the term gProductivity h is used, it is generally means Labor Productivity unless it is explicitly mentioned otherwise such as Total Factor Productivity or Capital Productivity, etc.

From the national perspective, the measure of labor productivity is defined as GDP per hour worked. There is a fundamental connection between productivity and economic growth. In other words:

Economic growth rate = Growth rate in labor productivity + Growth rate in total employment

From this relationship we see that an increase in labor productivity fundamentally affects the economic growth rate. More specifically, we see that increasing labor productivity is essential to expanding the scale of an economy without relying on an increase in the number of workers.
Secondly, there is a relationship between wages and productivity. When the labor distribution rate is constant, we see that:

Growth rate in labor productivity = Rate of increase in wages

Thus, so long as there is no change in the labor distribution rate, an increase in labor productivity is tied to an increase in wages. This means that an increase in productivity plays a major role in the prosperity of a nation and corporations and in individual wealth. Productivity, therefore, is a crucial indicator that has been widely used in measuring economic and corporate well-being.

Two key factors that can affect labor productivity are advances in technology and improvements in education and training. Differences in Labor Productivity are a key determinant of wage differences between industrialized and developing countries. In order for an economy to make further gains in material standard of living, workers must continue to invest in education and training, and firms must continue to invest in new technology.

See also: Introduction

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Lean Production System

Lean is about doing more with less, i.e., less time, inventory, space, labor, and money. The Lean Production System or Lean manufacturing is primarily based on the concept of Lean. The driving force of Lean Production System is the continuing shift of the market from supply driven market led by producers to demand driven market led by the consumers. This paramount shift forced the business to be more flexible to meet the diverse and fast changing demands of the consumers and at the same time to be remained competitive in the market. The main source of Lean Production System is The Toyota Production System (TPS), which was developed by the Toyota Motor Company after the Second World War. In the 1980's as western executives began taking note of Toyota fs success, academia also begun studying and writing about the benefits of this seemingly revolutionary production system. Two of these academics were James P. Womack of the Massachusetts Institute of Technology and Daniel T. Jones of the University of Cardiff in Wales. It is these authors who are widely credited for coining the term "lean manufacturing" to describe the Toyota Production System to westerns.

In essence, the terms "Toyota Production System" and "Lean Production System " mean the same thing and can be used interchangeably.

See also: 5S or Good Housekeeping; Kaizen; Toyota Production System

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Life Cycle Assessment

Life cycle assessment (LCA) is the process of evaluating the effects that a product has on the environment over its entire life. LCA provides objective answers and suggests more sustainable forms of production and consumption. It uses a scientific approach in which the quantification of effects plays a dominant role. A complete LCA is composed of three separate but interrelated components:

- Life cycle inventory is an objective process of identifying and quantifying the environmental loads involved, i.e., the energy and raw materials used and the emissions and waste consequently released (air emissions, liquid effluents, solid waste) throughout the life cycle of a product, process, or activity. Life cycle impact analysis is a technical quantitative and/or qualitative process to characterize and assess the effects of the environmental load identified in the inventory component. The assessment should address both ecological and human health considerations as well as such other effects as habitat modification and noise pollution.
- Life cycle improvement analysis is a systematic evaluation of the needs and opportunities to reduce the environmental burden associated with energy and raw material use and environmental releases throughout the whole life cycle of the product, process, or activity. This analysis may include both quantitative

measures of improvement such as changes in product, process, and activity design; raw material use; industrial processing; consumer use; and waste management.

See also: Green Purchasing

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Logical Framework Approach (LFA)

The logical framework approach (LFA) is an analytical and management tool that can help planners and managers analyze the existing situation during project preparation; establish a logical hierarchy of means by which objectives will be reached; identify the potential risks in achieving the objectives and to sustainable outcomes; establish how outputs and outcomes might best be monitored and evaluated; present a summary of the project in a standard format; and monitor and review projects during implementation. It can thus be used for planning many different types of projects.The approach involves problem analysis, stakeholder analysis, developing a hierarchy of objectives, and selecting a preferred implementation strategy. The product of this analytical approach is the logical framework matrix (the logframe), which is usually a one- to two-page document summarizing what the project intends to do and how, what the key assumptions are, and how outputs and outcomes will be monitored and evaluated.The LFA has been adopted by international financing institutions such as the World Bank and the Asian Development Bank, and a large number of agencies involved in providing development assistance such as the British DFID, Canada's CIDA, OECD Expert Group on Aid Evaluation, International Service for National Agricultural Research, Australia's AusAID, and Germany's GTZ.

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Low-cost Automation

Low-cost automation (LCA) describes a customized production system that bridges the technological frontier through intervention with unique automation in selected points of the production chain. Commonly found in labor-intensive environments in developing countries, it leverages the application of economies of scope and speed. Although a very old approach, LCA remains relevant to countries becoming more industrial based through increased flexibility and cost-efficiency.

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Malcolm Baldrige National Quality Award

One proven approach in increasing national productivity and enhancing competitiveness is the establishment of a national quality award program. That was the premise behind the establishment of the Malcolm Baldrige National Quality Award, established by an act of US Congress in 1987. Malcolm Baldrige National Quality Award is now considered as one of the prestigious national awards in the world that are driving business as well as non-business sector towards productivity improvement. Originally begun as a business-oriented framework for manufacturing, service, and small businesses, it was expanded in 1998 to include health care and educational organizations. Now it has been extended to nonprofit organizations as well, thereby encompassing governmental and other entities not previously included in award eligibility.The main objective of the award program, which is given by the President of the USA, is to recognize U.S. organizations for their achievements in quality and performance and to raise awareness about the importance of quality and performance excellence as a competitive edge. The award is not given for specific products or services.Malcolm Baldrige was Secretary of Commerce of USA from 1981 until his death in an accident in July 1987. Baldrige was a proponent of quality management as a key to his country's prosperity and long-term strength. He took a personal interest in the quality improvement act that was eventually named after him and helped draft one of the early versions. In recognition of his contributions, US Congress named the award in his honor.The Baldrige performance excellence criteria are a framework that any organization can use to improve overall performance. Seven categories make up the award criteria:

1. Leadership;
2. Strategic planning;
3. Customer and market focus;
4. Measurement, analysis, and knowledge management;
5. Human resource focus;
6. Process management;
7. Business results.

These seven categories are further subdivided into 19 items, each focusing on a major requirement of the category.The criteria for the Baldrige Award have played a major role in achieving the goals established by US Congress. They now are accepted widely, not only in the United States but also around the world, as the framework for performance excellence. The criteria are designed to help organizations enhance their competitiveness through continuing improvement process by focusing on two goals: delivering ever improving value to customers and improving overall organizational performance.

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Nanotechnology

"Nano" refers to measurement to the power of 9 or one-billionth (i.e., 1/109). Nanotechnology is a suite of techniques (nanoscience) used to manipulate matter at the scale of atoms and molecules. Nanoscientists are currently exploiting property changes at the nano scale to create new materials and modify existing ones. Considered to be the new impetus for radical changes, it could have a profound societal impact that may ultimately displace all aspects of socioeconomic development strata today (markets, jobs, competition, competitive advantages, comparative advantages, etc.).

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National Quality Awards

A national quality award is usually a country fs most prestigious award for enterprises (private or public) in recognition of business excellence in implementing a system wide quality management. The framework is usually an integrated performance/result-based approach translated into working guidelines called a performance excellence framework (with operating criteria and core values). System here refers to an organization, enterprise, or operating unit with a unique mission and objectives. Award systems are designed primarily to serve national interests by improving competitiveness or enabling sustainable economic growth.

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Natural Farming

Natural farming (also known as Fukuoka Farming or the Fukuoka Method) refers to a unique small-scale organic farming system that does not require weeding, pesticide or fertilizer applications, or tilling. Mr. Fukuoka Masanobu of Japan devoted his life to developing this unique farming system. Mr. Fukuoka Masanobu is one of the pioneers of no-till grain cultivation. The essence of Fukuoka's method is to reproduce natural conditions as closely as possible. In natural farming there is no plowing, no weeding and this minimal disturbance of the natural agro-ecosystem. However, organic farming allows operations such as land cultivation, weeding, etc.

See also: Nature Farming; Organic Farming

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Nature Farming

Nature farming is derived from Mokichi Okada's philosophy which abandons the use of all chemical fertilizers and pesticides and uses neither human nor unprocessed animal feces. Nature farming uses organic matter only, and doing so enhances the vitality of the soil and enriches its inherent power. Since nature farming does not rely on commercial fertilizers, it was initially called "fertilizer-free cultivation." However, the name was later changed to "nature farming" to make clear that this approach is based on a comprehensive theory of agriculture and an underlying philosophy that views the life-sustaining powers of the soil as integral to the workings of the universe.Both nature farming and organic farming abandon using chemical fertilizers and pesticides. However, organic farming allows use of all sorts of organic inputs, while nature farming emphasizes the use of processed organic matter only when doing so can enhance soil vitality.

See also: Natural Farming; Organic Farming

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Niche Agricultural Marketing

Niche agricultural marketing is the specialization of customers and agrifood products under innovative segmentations of the market. The marketer maneuvers to gain special recognition of the product and communication with the customers. The marketer has the ability to negotiate favorable pricing with customers. The product, customer, production, and delivery of the product are personalized. It is the opposite of bulk, commodity trade in mainstream marketing. Niche market production is generally small by definition. But the most distinct feature of niche marketing is the very high inherent value that has been added in the supply process.Niche food markets have grown tremendously in recent years. These markets are very attractive targets for small food producers and processors who naturally find it difficult to compete with large, multinational companies in more traditional markets. Exotic new fruits and vegetables, organic items, and specialty ethnic or lifestyle items all appear to be preferred by growing numbers of consumers and all have the potential to offer profitable niche markets for small farmers.

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Niche Marketing

A niche market is a very focused often small segment of a market that is usually not being served by mainstream or traditional markets or providers. A niche market may be

conceived as a narrowly defined group of potential customers. Usually the niche markets are lucrative because large businesses are not interested in such small segments, or may not be aware of the opportunity. Thus niche marketing is finding and serving profitable market segments and designing custom-made products and services for them.

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OHSAS 18000

OHSAS stands for occupational health and safety standard. OHSAS 18000 is a series of two standards, OHSA 18001 and OHSAS 18002, which provide requirements and guidelines, respectively, for implementing a safety and health management standard. Based on the British Standard BS 8800, OHSAS 18000 was developed by a group of standard bodies, certification bodies, registrars, and consultants and was first published in 1999. It is not an ISO standard.Although the OHSAS 18000 standards were not developed through the ISO, or using the ISO consensus process, they have gained wide acceptance. In 2002, amendments were made to both standards to consider user demands and better align these standards with ISO14001 and ISO9001.

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One Tambon, One Product (OTOP) Project

Inspired by One Village, One Product (OVOP) movement in Japan, the Thai government has been promoting the local industry through the manufacturing of attractive specialty products based on the abundant native culture, tradition and nature. This campaign is called, One Tambon One Product (OTOP) in Thailand because the target area is the administrative unit called ,Tambon, which is the equivalent of village or town in English. The objective of OTOP project is aimed to allow people living in communities to use their skills in manufacturing products while the government and the private sector would render assistance on developing the products and exploring the markets in order to create jobs, income and strengthening the communities.

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One Village, One Product (OVOP) Movement

The One Village, One Product (OVOP) movement, which was initiated in 1979 in Oita prefecture, Japan, is an innovative program in which each local community identifies one or a few products as locally specific, concentrates resources on its production, establishes

it as a local brand, and markets it to the entire country or beyond. The movement tries to revitalize depressed local communities by combining the production of commodities with local pride and human resources development. The OVOP and similar movements have also been implemented with some modifications in other APO member countries. In Thailand, the One Tambon, One Product movement is strongly promoted as a core national policy of rural community development.

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Organic Farming

Organic farming involves holistic production management systems (for crops and livestock) emphasizing the use of management practices in preference to the use of off-farm inputs such as agrochemicals. This is accomplished by using, where possible, cultural, biological, and mechanical methods in preference to synthetic materials. Environment-friendly approaches/strategies such as IPM, IPNM, and integrated production systems can be used to pursue organic farming. Organic farming is meant to produce organic food/agricultural products for better human health with minimum impact on the environment. The certification of organic products can be a challenge, especially for less developed countries.

See also: Nature Farming; Natural Farming

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Outsourcing

Outsourcing is a business practice that involves the transfer of an organizational function (often noncore activities) to a third party. When this third party is located in another country, the term "offshore outsourcing" may be used. Today many organizations are outsourcing largely due to the benefits it offers, such as lower labor costs or cheaper foreign currencies. Outsourcing enables companies to develop competitive strategies that will leverage their financial positions in the global marketplace. Outsourcing is also successful in increasing product quality or lowering firm and consumer costs. Since outsourcing enables lower costs, even if quality decreases slightly, productivity increases, which benefits the economy in aggregate.

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Participatory Irrigation Management

The term participatory irrigation management (PIM) refers to the participation of irrigation users, i.e., farmers, in the management of irrigation systems not merely at the tertiary level of management but spanning the entire system. Participation should not be construed as consultation alone. The concept of PIM refers to management by irrigation users at all levels of the system and in all aspects of management. This is the simplicity and flexibility of PIM. There can be different forms of participation at different levels in the system with varying degrees of accountability and responsibility. Management by irrigation users, rather than by a government agency, is often the best solution. Contrary to the traditional concept that irrigation management requires a strong public-sector role, the PIM approach starts with the assumption that the irrigation users themselves are best suited to manage their own water.

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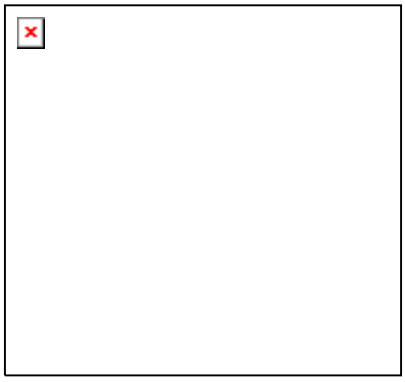
PDCA Cycle

PDCA stands for Plan, Do, Check, and Act. The PDCA Cycle is a checklist of the four stages which one must go through to get from 'problem-faced' to 'problem solved'. The four stages are Plan-Do-Check-Act, and they are carried out in the cycle illustrated below.The concept of the PDCA Cycle was originally developed by Walter Shewhart, the pioneering statistician who developed statistical process control in the Bell Laboratories in the US during the 1930's. It is often referred to as 'the Shewhart Cycle'. It was taken up and promoted very effectively from the 1950s on by the famous Quality Management authority, W. Edwards Deming, and is consequently known by many as the "Deming Cycle" or "Deming Wheel". The following is the description of PDCA:



Plan: Determine the root cause of the problem then plan a change or a test aimed at improvement.

Do: Carry out the change or the test, preferably in a pilot or on a small scale.

Check: Check to see if the desired result was achieved, what or if anything went wrong, and what was learned.

Act: Adopt the change if the desired result was achieved. If the result was not as desired, repeat the cycle using knowledge obtained from the previous cycle.

Although this is a continuous cycle, one needs to start somewhere. As a problem solving process one would normally start at the Check stage, checking what the requirements are and reality is. The gap between reality and requirements will enable to determine if it is needed to Act.To use this as a problem solving technique it does rely on there being a process already in place, which can then be modified.

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Postharvest Management

Postharvest management refers to the systematic handling of agricultural products/commodities after harvesting. The postharvest chain involves a series of operations starting immediately after harvesting a product to its consumption. Postharvest operations include cleaning/washing, cooling, storage, grading, packaging, transportation, processing, and marketing. Agricultural commodities, especially perishables, suffer from huge postharvest losses. For example, such losses are estimated at up to 30-40% of fruit and vegetables in many developing Asian countries. The aim of postharvest management is to minimize postharvest losses, maximize added value, and improve food safety. This ultimately should benefit the whole community, whether through increased sales/export earnings or extending the availability of fresh produce through the year.

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Precision Farming

Precision farming, or site-specific farming, or precision agriculture is an integrated crop management system in which areas of land/crop within a field may be managed with different levels of inputs depending upon the yield potential of the crop on that specific plot of land. There are two main benefits: a) reduced cost of production, which helps farmers save money; and b) minimizing the risk of environmental pollution from excessive use of agrochemicals. Precision farming relies on the existence of in-field variability. It requires the use of new technologies, such as global positioning systems, sensors, satellites or aerial images, and information management tools to assess and understand variations. Collected information may be used to evaluate optimum sowing density, estimate fertilizers and other inputs needed, and predict crop yields accurately.

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Preventive and productive maintenance (PPM)

Preventive maintenance means taking measures in advance, before corrective action is needed with regard to the functioning of the equipment. Productive maintenance is when the result of maintenance of equipment is measured (normally in economic terms, e.g., cost-benefit analysis, and the result is positive (i.e., tuning your car regularly will not only prevent damage, it will also save fuel costs. If the fuel saving is superior to the tuning costs, that is productive maintenance). Together, they are referred to as PPM. Total productive maintenance is a systematic approach to productive maintenance.

PPM is useful as a means for enhancing productivity, minimizing down time, and maximizing efficiency. It involves keeping equipment operating at peak performance levels to help reduce waste.

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Program evaluation review technique (PERT)/critical path method (CPM)

The program evaluation review technique (PERT) and critical path method (CPM) are tools useful in planning, scheduling, and managing complex projects. PERT/CPM (sometimes referred to as network analysis) provides a focus around which managers and project planners can brainstorm. It is useful for evaluating the performance of individuals and teams. The key concept in CPM/PERT is that a small set of activities, which make up the longest path through the activity network, control the entire project. If these "critical" activities can be identified and assigned to the responsible persons, management resources can be optimally used by concentrating on the few activities that determine the fate of the entire project. Noncritical activities can be replanned or rescheduled, and resources for them can be reallocated flexibly, without affecting the whole project.

There are many variations of CPM/PERT which have been useful in planning costs and scheduling manpower and machine time. CPM/PERT can answer the following important questions: a) How long will the entire project take to be completed? What are the risks involved? b) Which are the critical activities or tasks in the project which could delay the entire project if they were not completed on time? c) Is the project on schedule, behind schedule, or ahead of schedule? d) If the project must be finished earlier than planned, what is the best way to do this at the least cost?

PERT/CPM can be used manually, but it is much easier to use project management software (e.g., RFFlow).Operational research and quantitative management books usually provide detailed descriptions of how to use these tools.

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Project Cycle Management (PCM)

PCM, originating from ZOPP (the German abbreviation of "objective-oriented project planning"), consists of three steps: participatory planning; appraisal; and monitoring and evaluation. These three steps are interlinked by a single format called the project planning matrix (PPM). The use of the PPM provides consistency in PCM throughout the project process. Another attribute of PCM is its logical consistency. It analyzes present conditions and problems by clarifying cause and effect, allowing a logical means-to-an-end relationship to be identified. The workshop format is the most prominent feature of PCM. To reach a common understanding for project formulation and management, groups implementing PCM organize a series of workshops with the participation of all stakeholders.

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Quality Auditor

Auditors ascertain the existence or lack (usually tangible) of a practice in a specific or narrow scope of determinants as measured against predetermined or prescribed standards. The final outcome of an audit is usually a yes/no consideration. The Quality Auditor is a professional who understands the standards and principles of auditing and the auditing techniques of examining, questioning, evaluating, and reporting to determine a quality system's adequacy and deficiencies. The quality auditor analyzes all elements of a quality system and judges its degree of adherence to the criteria of industrial management and quality evaluation and control systems.

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Quality Management System (QMS)

A quality management system (QMS) is the part of the overall management system that ensures that you can meet or exceed customer expectations for quality in products and services. A QMS includes the development of a formalized quality policy, as well as a planning phase outlining the structures, responsibilities, and procedures for quality within an organization. It also includes the verification of those procedures and a focus on continual improvement of the system.

A QMS allows the organization to take control of the quality of its products and services.

It allows putting a plan in place for consistency, allowing an organization to determine when corrective actions are needed. QMS are quality and productivity tools, and therefore benefit the whole organization. Benefits can also extend to the supply chain if applied throughout, improving product quality and the relationships between suppliers, clients, and end customers.

See also: ISO9000

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Responsible Care

Responsible Care is the worldwide chemical industry program for continuous improvement of safety, health, and environmental performance. It was started in Canada in 1984 and was adopted in the USA in late 1988, and in Western Europe and Australia in 1989/90. Today, Responsible Care is being implemented in 40 countries. In the Asia-Pacific region it is being implemented in Australia, New Zealand, the Philippines, Hong Kong, Malaysia, Singapore, the Republic of China, Japan, and India.

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Risk

Risk as a business concept denotes a potential negative impact to an asset or to the business arising from current business processes or any future event. In daily usage, risk is often used synonymously with the chances or probability of a loss. In professional risk assessments, risk combines the probability of an event occurring with the impact that the event would have and with its diverse resulting circumstances. While risk is often associated with avoidance of negative outcomes, in game theory or finance it can be a measure of variance of possible outcomes. It is easier to understand as insurance, where the purchaser buys insurance to reduce risk and is protected from potential loss that may result in the future.

See also: Risk Management

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Risk Management

Risk management is the process of managing risk. It involves measuring and assessing risk and developing strategies to manage it. Strategies may include avoidance, transfer to another party, reducing possible negative effects, and accepting some or all of the consequences. Traditional risk management focuses on risks arising from physical or legal causes (e.g., natural disasters or fires, accidents, deaths, and lawsuits). The concept of risk is evolving rapidly, moving beyond the corporate management of liability and financial risk to an enhanced understanding of the impacts of less tangible risks, which can profoundly impact markets, corporate profitability, reputation, and brands.

Risk management helps create immediate value from the identification and reduction of risks that lower productivity. In risk management, a prioritization process is followed whereby the risks with the greatest loss and the greatest probability of occurrence are dealt with first, and risks with lower probability of occurrence and lower loss are handled later. Balancing between risks with a high probability of occurrence but lower loss and against a risk with high loss but lower probability of occurrence can be challenging to organizations.

See also: Risk

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Rural Rapid Appraisal/Participatory Rural Appraisal

Rural rapid appraisal (RRA) is a social science approach that emerged in the early 1980s. A multidisciplinary team employs simple, nonstandard methods and the knowledge of local people to elicit, analyze, and evaluate information and hypotheses on rural life and rural resources relevant for planning action. RRA techniques are an attractive alternative to conventional survey methods because they allow relatively rapid assessment of local knowledge, needs, and community potential with the aim of devising strategies to solve the problems identified.

Participatory rural appraisal (PRA) can be described as a family of approaches, methods, and behaviors enabling people to express and analyze the realities of their lives and conditions, to plan for themselves which actions to take, and to monitor and evaluate the results. Its methods have mainly evolved from RRA. The major difference is that PRA emphasizes processes that empower local people, whereas RRA is mainly seen as a means for outsiders to gather information. The outsiders act mainly as supporting "facilitators," while the local people "own" and use the results of the study. This enables local communities to assume responsibility for implementing the activities based on such results. PRA methods are successful within the scope of programs that support participatory development cooperation.

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Sanitary and Phytosanitary Measures

Sanitary and phytosanitary (SPS) measures deal with food safety and animal and plant health standards. SPS measures (standards) are set by international organizations (the FAO-WHO Codex Alimentarius Commission for food safety; the International Office for Epizootics for animal health; the FAO's Secretariat of the International Plant Protection Convention for plant health).

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Six Sigma

Six Sigma was first launched by Motorola in 1987 which gave it over ten fold improvements. Tomkins defines six sigma as "a program aimed at the near elimination of defects from every product, process and transaction". Others defined it as a strategic initiative to boost profitability, increase market share and improve customer satisfaction through the use of statistical tools that can lead to breakthrough quantum gains in quality. Professor Park believes that six sigma is a "new strategic paradigm of management innovation for company survival in this 21st century, which involves statistical measurement; management strategy and quality culture. If deployed correctly, Six Sigma has the ability to generate a host of benefits to business companies, e.g., improving process speed, raising quality levels, reducing costs, increasing revenues, and deepening customer relationships, among others. Six Sigma is implemented in major companies such as GE, AlliedSignal, Dow, DuPont, Ford Motor Company, Merrill Lynch, Toshiba, and Samsung and LG Group, among others. Six Sigma reportedly enabled billions of dollars in savings as well as sustained earnings improvement. Thus Six Sigma is widely regarded as a new strategic paradigm for management innovation and for survival of business companies. It is used in a variety of industries and business models, from manufacturing to services.

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Social Capital

Social capital is a new form of capital that has been found to contribute to productivity, business, and society. It refers to the norms, trust, and networks that form the basis of relationships in business and society. Robert Putnam defines social capital as "features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions." What is broadly agreed is that social norms and/or social networks are key elements of social capital, and that trust is also a part of it.

Social capital is widely seen as a resource that facilitates cooperation within or between groups of people. It can arise in relationships in many areas of life.

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Statistical process control (SPC)

Statistical process control (SPC) is the application of statistical tools to analyze a business process. Often SPC refers to seven analytical tools, referred to as 7QC tools:

Fishbone diagram (Ishikawa or cause-and-effect diagram)
Checklist
Control chart
Flowchart
Histogram
Pareto diagram
Scatter diagram

The literature on 7QC tools is inconsistent in its listing of the seven tools. Some list run charts, others include stratification. This inconsistency is not important; the real issue is that one should use the appropriate tools.

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Sustainable Agriculture

Sustainable development is the management and conservation of the natural resource base and the orientation of technological and institutional change in a manner that ensures the continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry, and fishery sectors) conserves land, water, and plant and animal genetic resources and is environmentally non-degrading, technically appropriate, economically viable, and socially acceptable.

Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs. Therefore, stewardship of both natural and human resources is of prime importance. Stewardship of human resources includes consideration of social responsibilities such as the working and living conditions of laborers, the needs of rural communities, and consumer health and safety both in the present and future. Stewardship of land and natural resources involves maintaining or enhancing this vital resource base for the long term.

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SWOT Analysis

A scan of the internal and external environment is an important part of the strategic planning process. Environmental factors internal to the firm usually can be classified as strengths (S) or weaknesses (W), and those external to the firm can be classified as opportunities (O) or threats (T). Such analysis of the strategic environment is referred to as SWOT analysis. SWOT analysis is a widely used strategic planning tool for a project or business venture, as well as for organizations and individuals, that require a decision-making. SWOT analysis provides information that is helpful in matching an enterprise's resources and capabilities to the competitive environment in which it operates. It is therefore instrumental in strategy formulation and selection and forms the first stage of planning to focus on key issues.

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Taguchi method

The Taguchi method of product design, pioneered by Dr. Genichi Taguchi is an experimental approximation that shows how the statistical design of experiments (DOE) can help design and manufacture high-quality products and reduce product development time and cost. The method is also called "robust design," Dr. Taguchi fs approach is primarily focused on eliminating the causes of poor quality and making product performance insensitive (less variable and more robust) in the face of the variation of expected problems. DOE is a powerful statistical technique for determining the optimal factor settings of a process performance, thereby achieving reduced process variability and improved manufacturability of products. Dr. Taguchi refers to DOE as "off-line quality control" because it is a method of ensuring good performance in the design stage of products or processes, while other sets of experimental designs are called "on-line quality control" because they are used while the process is operating. In a nutshell, it is a technique for designing and performing experiments to investigate processes where the output depends on many factors (variables; inputs) with the fewest trials and errors and without uneconomical operations of the processes using all possible combinations of those variables. The method systemically chooses optimal combinations of the variables desired.

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Total Factor Productivity

Total factor productivity (TFP) refers to the productivity of all inputs taken together. TFP

is a measure of the output of an industry or economy relative to the size of all of its primary factor inputs. When the growth of a nation's economic output over time is compared with the growth of its labor force and its capital stock ("inputs") it is usually found that the former exceeds the latter. This is due to the growth of TFP, that is, the ability to combine the factors (labor and capital) more effectively over time. This can be due to changes in qualities (more appropriate skills or embedded technologies) or to better methods of organization. TFP represents any effects in total output not accounted for by inputs. It addresses the real driver of output growth, not contributed by growth in productivity or inputs such as capital stock and the labor force. TFP can be interpreted as growth through technological innovation and efficiency achieved by enhanced labor skills and capital management.

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Total Quality Management

Total quality management (TQM) is more than a concept; it is a philosophy by itself. TQM is defined as a management strategy for an organization, centered on awareness of quality in all organizational processes. According to the American Society for Quality, the term "total quality management" was first used by the US Naval Air Systems Command "to describe its Japanese-style management approach to quality improvement." The TQM management strategy is based on the participation of all members and aiming at long-term success through customer satisfaction and benefits to all members of the organization and society. TQM relies on all necessary quality management tools to achieve and maintain the desired level of quality in everyday operations, allowing for continual improvement of operations and meeting changing customer expectations.

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Toyota Production System

The Toyota Production System (TPS), sometimes also referred to as "Lean Production System", refers to the principles and practice of lean manufacturing or lean production systems. Lean manufacturing or lean production systems or the Toyota Production System, is the systematic elimination of all types of waste. It is also about the implementation of the concepts of continuous flow and customer satisfaction, through a flexible production system that allows for "flexibility" and rapid "customization."

TPS is the philosophy which organizes manufacturing and logistics at Toyota, including the interaction with suppliers and customers. It was largely created by the founder of Toyota, Sakichi Toyoda, his son Kiichiro Toyoda, and the engineer Taiichi Ohno; The focus of TPS is the elimination of waste and defects at all points of production including

input, process, and final output (delivery) through the ingenuity of individual staff and creativity of teams in designing and implementing an error-proof work system. Toyota's chairman described the TPS as: "To build [quality] cars we need to build people first. That is in essence the TPS way. Indeed, TPS is also about truly empowering people and giving them the knowledge to be successful. Failures and problems are okay and are viewed as learning opportunities and a way to address the root cause. The true strength of TPS is the understanding that people are the real strength, not just techniques. Jidoka or "autonomation" with a human touch and Just-in-Time are two major components of TPS. "The main goal of the TPS is to eliminate Muda, the Japanese term for "waste". There are 7 kinds of waste targeted in the TPS.

1. Waiting (of operator or machine)
2. Transporting
3. Processing Itself
4. Inventory (raw material)
5. Motion (of operator or machine)
6. Defects(rework & scrap)
7. Over-production

Toyota was able to greatly reduce lead time and cost using the TPS, while improving quality at the same time. This enabled it to become one of the leading automobile companies in the world. The TPS is a classic example of the Kaizen approach to productivity improvement. It is a flexible system to produce various quantities of different products within a very short delivery period. Techniques for the TPS include concurrent engineering, relationships with excellent suppliers, just-in-time production, 5S, total quality management, total productive maintenance, supply chain management, etc. Due to this stellar success of the production philosophy many of these methods have been copied by other manufacturing companies. Since the 1980s, the TPS has been so popular that it has been dubbed the "least-cost method of manufacturing," or "ultimate production system."

See also: 5S or Good Housekeeping; 7 Wastes; Kaizen; Lean Production System

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