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Learning and Knowledge-Creating Organization: The Key to Greater Success
Appendix: SUT as a Learning Organisation

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Abstract
Continuous improvement programs are rapidly expanding as corporations seek to better themselves and gain an edge. However, failed programs far outnumber successes, and improvement rates remain low. That is because most companies have failed to grasp a basic truth. Before people and companies can improve, they first must learn. To do so, they need to look beyond rhetoric and high philosophy and focus on the fundamentals. Garvin (1998) advocates that three important issues must be addressed before a company can truly become a learning organization. First is the question of meaning: a well-grounded, easy-to-apply definition of a learning organization. Second comes management: clearer operational guidelines for practice. Finally, better tools for measurement can assess an organisation's rate and level of learning. To say the least, no learning organisation is built overnight. Success comes from carefully cultivated attitudes, commitments, and management processes that accrue slowly and steadily. But the first step for every organisation is to foster an environment conducive to learning and improvement.

Introduction
Continuous improvement programs are sprouting up all over as organizations strive to better themselves and gain an edge. The topic list is long and varied, and sometimes it seems as though a program a month is needed just to keep up. Unfortunately, failed programs far outnumber successes, and improvement rates remain distressingly low. This is because most companies have failed to grasp a basic truth. Continuous improvement requires a commitment to learning.

So, the question is: how can an organization improve without first learning something new? Solving a problem, introducing a product, and reengineering a process all require seeing the world in a new light and acting accordingly. In the absence of learning, companies--and individuals --- simply repeat old practices. Change remains cosmetic, and improvements are either fortuitous or short-lived.

Meaning, Management, and Measurement
Scholars are partly to blame. Their discussions of learning organizations have often been reverential and utopian, filled with near mystical terminology. Paradise, they would have often been reverential and utopian, filled with near mystical terminology. Paradise, they would have you believe, is just around the corner. Peter Senge, who popularized learning organizations in his book the Fifth Discipline, described them as places "where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together." To achieve these ends, Senge suggested the use of five "component technologies": systems thinking, personal mastery, mental models, shared vision, and team learning. In a similar spirit,

Ikujiro Nonaka characterized knowledge-creating companies as places where "inventing new knowledge is not a specialized activity . . . it is a way of behaving, indeed, a way of being, in which everyone is a knowledge worker." Nonaka suggested that companies use metaphors and organizational redundancy to discuss thinking, encourage dialogue, and make tacit, instinctively understood ideas explicit.

Most discussions of learning organizations finesse these issues. Their focus is high philosophy and grand themes, sweeping metaphors rather than the gritty details of practice. Three critical issues are left unresolved; yet each is essential for effective implementation. First is the question of meaning. We need a plausible, well-grounded definition of learning organizations; it must be actionable and easy to apply. Second is the question of management. We need clearer guidelines for practice, filled with operational advice rather than high aspirations. And third is the question of measurement. We need better tools for assessing an organization's rate and level of learning to ensure that gains have in fact been made.

If these "three Ms" are addressed, managers will have a firmer foundation for launching learning organizations. Without this groundwork, progress is unlikely, and for the simplest of reasons. For learning to become a meaningful corporate goal, it must first be understood.

What Is a learning Organization?

Surprisingly, a clear definition of learning has proved to be elusive over the years. Organizational theorists have studied learning for a long time; the accompanying quotations suggest that there is still considerable disagreement. Most scholars view organizational learning as a process that unfolds over time and link it with knowledge acquisition and improved performance. But they differ on other important matters.

As a first step, consider the following definition:

A learning organization is an organization skilled at creating acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights.

This definition begins with a simple truth: new ideas are essential if learning is to take place. Sometimes they are created do novo, through flashes of insight or creativity; at other times they arrive from outside the organization or are communicated by knowledgeable insiders. Whatever their source, these ideas are the trigger for organizational improvement. But they cannot by themselves create a learning organization. Without accompanying changes in the way that work gets done, only the potential for improvement exists.

Other Definitions of Organizational Learning

Scholars have proposed a variety of definitions of organizational learning. Here is a small sample:

Organizational learning means the process of improving actions through better knowledge and understanding.

C. Marlene Fiol and Marjorie A. Lyles, "Organizational Learning,"Academy of Management Review, October 1985.

An entity learns if, through its processing of information, the range of its potential behaviors is changed.

George P. Huber, “Organizational Learning: The Contributing Processes and the Literatures,” Organization Science, February 1991.

Organizations are seen as learning by encoding inferences from history into routines that guide behavior.

Barbara Levit and James G. March, “Organizational Learning,” American Review of Sociology, Vol. 14, 1988.

Organizational learning is a process of detecting and correcting error.

Chris Argyris, “Double Loop Learning in Organizations,” Harvard Business Review, September-October 1977.

Organizational learning occurs through shared insights, knowledge, and mental models . . . [and] builds on past knoledge and experience—that is, on memory

Ray Stata, “Organizational Learning-The Key to Management Innovation,” Sloan Management Review, Spring 1989.

Building Blocks

Learning organizations are skilled at five main activities: systematic problem solving, experimentation with new approaches, learning from their own experience and past history, learning from the experiences and best practices of others, and transferring knowledge quickly and efficiently throughout the organization. Each is accompanied by a distinctive mind-set, tool kit, and pattern of behavior. Many companies practice these activities to some degree. But few are consistently successful because they rely largely on happenstance and isolated examples. By creating systems and processes that support these activities and integrate them into the fabric of daily operations, companies can manage their learning more effectively.

1. ***Systematic problem solving***. This first activity rests heavily on the philosophy and methods of the quality movement. Its underlying ideas, now widely accepted, include:

- Relying on the scientific method, rather than guesswork, for diagnosing problems (what Deming calls the “Plan, Do, Check, Act” cycle, and others refer to as “hypothesis – generating, hypothesis-testing” techniques).
- Insisting on data, rather than assumptions, as background for decision making (what quality practitioners call “fact-based management”).
- Using simple statistical tools (histograms, Pareto charts, correlations, cause-and-effect diagrams) to organize data and draw inferences.

2. ***Experimentation***. This activity involves the systematic searching for and testing of new knowledge. Using the scientific obvious parallels to systematic problem solving. But unlike problem solving, experimentation is usually motivated by opportunity and expanding horizons, not by current difficulties. It takes two main forms: ongoing programs and one-of-a-kind demonstration projects.
3. ***Learning from past experience***. Companies must review their successes and failures, assess them systematically, and record the lessons in a form that employees find open and accessible. One expert has called this process the “Santayana Review,” citing the famous philosopher George Santayana, who coined the phrase “Those who cannot remember the past are condemned to repeat it.” Unfortunately, too many managers today are indifferent, even hostile, to the past, and by failing to reflect on it, they let valuable knowledge escape.
4. ***Learning from others***. Of course, not all learning comes from reflection and self-analysis. Sometimes the most powerful insights come from looking outside one’s immediate environment to gain a new perspective. Enlightened managers know that even companies in completely different businesses can

be fertile sources of ideas and catalysts for creative thinking. At these organizations, enthusiastic borrowing is replacing the "not invented here" syndrome. Milliken calls the process SIS, for "Steal Ideas Shamelessly"; the broader term for it is benchmarking. According to one expert, "benchmarking is an ongoing investigation and learning experience that ensures that best industry practices are uncovered, analyzed, adopted, and implemented." Benchmarking is one way of gaining an outside perspective; another, equally fertile source of ideas is customers

Whatever the source of outside ideas, learning will only occur in a receptive environment. Managers can't be defensive and must be open to criticism or bad news. This is a difficult challenge, but it is essential for success. Companies that approach customers assuming that "we must be right, they have to be wrong" or visit other organizations certain that "they can't teach us anything" seldom learn very much. Learning organizations, by contrast, cultivate the art of open, attentive listening.

5. Transferring knowledge. For learning to be more than a local affair, knowledge must spread quickly and efficiently throughout the organization. Ideas carry maximum impact when they are shared broadly rather than held in a few hands. A variety of mechanisms spur this process, including written, oral, and visual reports, site visits and tours, personnel rotation programs, education and training programs, and standardization programs. Each has distinctive strengths and weaknesses. Reports and tours are by far the most popular mediums. Reports serve many purposes: they summarize findings, provide checklists of dos and don'ts, and describe important processes and events. They cover a multitude of topics, from benchmarking studies to accounting conventions to newly discovered marketing techniques. Today written reports are often supplemented by videotapes, which offer greater immediacy and fidelity.

As the PPG example suggests, education and training programs are powerful tools for transferring knowledge. But for maximum effectiveness, they must be linked explicitly to implementation. All too often, trainers assume that new knowledge will be applied without taking concrete steps to ensure that trainees actually follow through. Seldom do trainers provide opportunities for practice, and few programs consciously promote the application of their teachings after employees have returned to their jobs.

Measuring Learning

Managers have long known that "if you can't measure it, you can't manage it." This maxim is as true of learning as it is of any other corporate objective. Traditionally, the solution has been "learning curves" and manufacturing progress functions." Both concepts date back to the discovery, during the 1920s and 1930s, that the costs of airframe manufacturing fell predictably with increases in cumulative volume. These increases were viewed as proxies for greater manufacturing knowledge, and most early studies examined their impact on the costs of direct labor. Later studies expanded the focus, looking at total manufacturing costs and the impact of experience in other industries, including shipbuilding, oil refining, and consumer electronics. Typically, learning rates were in the 80% to 85% range (meaning that with a doubling of cumulative production, costs fell to 80% to 85% of their previous level), although there was wide variation.

For companies hoping to become learning organizations, however, these measures are incomplete. They focus on only a single measure of output (cost or price) and ignore learning that affects other competitive variables, like quality, delivery, or new product introductions. They suggest only one possible learning driver (total production volumes)

and ignore both the possibility of learning in mature industries, where output is flat, and the possibility that learning might be driven by other sources, such as new technology or the challenge posed by competing products. Perhaps most important, they tell us little about the sources of learning or the levers of change.

Organizational learning can usually be traced through three overlapping stages. The first step is cognitive. Members of the organization are exposed to new ideas, expand their knowledge, and begin to think differently. The second step is behavioral. Employees begin to internalize new insights and alter their behavior. And the third step is performance improvement, with changes in behavior leading to measurable improvements in results: superior quality, better delivery, increased market share, or other tangible gains. Because cognitive and behavioral changes typically, precede improvements in performance, a complete learning audit must include all three.

Finally, a comprehensive learning audit also measures performance. Half-life curves or other performance measures are essential for ensuring that cognitive and behavioral changes have actually produced results. Without them, companies would lack a rationale for investing in learning and the assurance that learning was serving the organization's ends.

First Steps

Learning organizations are not and cannot be built overnight. Most successful examples are the products of carefully cultivated attitudes, commitments, and management processes that have accrued slowly and steadily over time. Still, some changes can be made immediately. Any company that wishes to become a learning organization can begin by taking a few simple steps.

The first step is to foster an environment that is conducive to learning. There must be time for reflection and analysis, to think about strategic plans, dissect customer needs, assess current work systems, and invent new products.

Another powerful lever is to open up boundaries and stimulate the exchange of ideas. Boundaries inhibit the flow of information; they keep individuals and groups isolated and reinforce preconceptions. Opening up boundaries, with conferences, meetings, and project teams, which either cross organizational levels or link the company and its customers and suppliers, ensures a fresh flow of ideas and the chance to consider competing perspectives.

Together these efforts help to eliminate barriers that impede learning and begin to move learning higher on the organizational agenda. They also suggest a subtle shift in focus, away from continuous improvement and toward a commitment to learning. Coupled with a better understanding of the "three Ms," the meaning, management, and measurement of learning, this shift provides a solid foundation for building learning organizations.

Knowledge Creation in an Organisation

In his Executive Summary, Nonaka(1998, pp.21-22) reveals that in an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge. And yet, few managers understand the true nature of the knowledge-creating company-let alone know how to manage it.

According to Japanese organizational theorist Ikujiro Nonaka, the problem is that most Western managers hold a too-narrow view of what knowledge is and what companies must do to exploit it. They believe that the only useful knowledge is "hard" or

quantifiable data. And they see the company as a kind of machine for "information processing."

But there is another way to think about knowledge and its role in business organizations. It is found most commonly at highly successful Japanese companies such as Honda, Canon, Matsushita, and Sharp. Manages at these companies recognize that creating new knowledge is not simply a matter of mechanistically "processing' objective information. Rather, it depends on tapping the tacit and often highly subjective insights, intuitions, and ideals of employees. The means for making use of such knowledge are often "soft"-taking the form of slogans, metaphors, and symbols-but they are indispensable tools for continuous innovation.

The reasons Japanese companies seem especially good at this holistic kind of knowledge creation are complicated. But the key lesson for managers is quite simple: much as manufacturers around the world have learned from Japanese manufacturing techniques, any company that wants to compete on knowledge must also learn form Japanese techniques of knowledge creation. Using vivid examples from leading Japanese companies, Nonaka proposes a fresh way to think about managerial roles and responsibilities, organizational design, and business practices in the knowledge-creating company.

Smart Thinking Can Help Create Knowledge

Smart thinking is synonymous with critical, logical, or rational thinking. As pointed out by Allen (1998), smart thinking can help us in:

- Working out where and how to look for the information we need
- Understanding that information in relation to our own work
- Deciding which information is relevant to our topic and which is not
- Working out and expressing our main ideas
- Planning our communication so that it is clearly understood and convincing
- Checking to see if we have covered all the important parts of our topic
- Establishing a framework or structure in which our basic facts and evidence make sense

Smart thinking can also improve our capacity to set your communication in context. It alerts you to the importance of:

- Our audience and their expectations of what we are doing
- The informal requirements upon us to communicate in a certain way in a certain situation
- Our own assumptions and biases, which need to be considered and explored through our communication

Smart thinking addresses these issues and improves our reasoning skills that will in turn provide an impetus for achieving a learning organisation.

Freedoms as Key to Creating Knowledge

Sen(2000, p.8), mentions regarding institutions and freedoms, "Individuals live and operate in a world of institutions. Our opportunities and prospects depend crucially on what institutions exist and how they function. Not only do institutions contribute to our freedoms, their roles can be sensibly evaluated in the light of their contributions to our freedoms."

Stages of Knowledge

Scholars have suggested that production and operating knowledge can be classified systematically by level or stage of understanding. At the lowest levels of manufacturing knowledge, little is known other than the characteristics of a good product. Production remains an art, and there are few clearly articulated standards or rules. An example would be Stradivarius violins. Experts agree that they produce vastly superior sound, but no one can specify precisely how they were manufactured because skilled artisans were responsible. By contrast, at the highest levels of manufacturing knowledge, all aspects of production are known and understood. All materials and processing variations are articulated and accounted for, with rules and procedures for every contingency. Here an example would be a "lights out," fully automated factory that operates for many hours without any human intervention.

Overall, this framework specifies eight stages of knowledge(from lowest to highest):

1. Recognizing prototypes (what is a good product).
2. Recognizing attributes within prototypes (ability to define some conditions under which process gives good output).
3. Discriminating among attributes (which attributes are important Experts may differ about relevance of patterns; new operators are often trained through apprenticeships).
4. Measuring attributes (some key attributes are measured; measures may be qualitative and relative).
5. Locally controlling attributes (repeatable performance; process designed by expert, but technicians can perform it).
6. Recognizing and discriminating between contingencies (production process can be mechanized and monitored manually).
7. Controlling contingencies (process can be automated).
8. Understanding procedures and controlling contingencies (process is completely understood).

(Adapted from work by Ramchandran Jaikumar and Roger Bohn)

Conclusion

Continuous improvement programs are rapidly expanding as corporations seek to better themselves and gain an edge. However, failed programs far outnumber successes, and improvement rates remain low. That's because most companies have failed to grasp a basic truth. Before people and companies can improve, they first must learn. To do so, they need to look beyond rhetoric and high philosophy and focus on the fundamentals. Three important issues must be addressed before a company can truly become a learning organization. First is the question of meaning: a well-grounded, easy-to-apply definition of a learning organization. Second comes management: clearer operational guidelines for practice. Finally, better tools for measurement can assess an organisation's rate and level of learning. To say the least, no learning organisation is built overnight. Success comes from carefully cultivated attitudes, commitments, and management processes that accrue slowly and steadily. But the first step for every organisation is to foster an environment conducive to learning and improvement, to think smart, and provide institutional freedoms for employees to learn and create new bodies of knowledge for the benefits of the organisation in particular and the world in general.

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Appendix: SUT as a learning organisation.

APPENDIX
SURANAREE UNIVERSITY OF TECHNOLOGY : A LEARNING ORGANISATION

1 Concept and Rationale

Suranaree University of Technology (SUT) is the first state university, a regional university, a national and international university that does not come under the Thai civil service system. A corporation under the supervision of the Minister of University Affairs, SUT's status is a university under government supervision according to the 1990 Suranaree University of Technology Bill and the 1994 Ministry of University Affairs Civil Service Procedures Royal Bill. Hence SUT has a different administrative system from other civil service systems to be highly effective at international level of educational administration.

Historically, the Sixth National Social and Economic Development Plan (1987-1991) prescribed, among other things, an increased distribution of opportunities for post-secondary education to rural areas as a major higher education development policy. During the tenure of General Prem Tinsulanonda as Prime Minister, the Cabinet assigned the Ministry of University Affairs to create a subcommittee to study the possibility of establishing new state universities in the provinces. The subcommittee recommended the founding of five new regional colleges: one each in the South, the North and the East, and two in the Northeast-one in Nakhon Ratchasima and one in Ubon Ratchathani. Khon Kaen University was initially assigned to oversee the establishment of the new north-eastern colleges. However, only one college in Ubon Ratchathani was successfully established. The rest were continued by the new government led by General Chatichai Choonhavan(1988). The Cabinet passed a resolution appointing a committee to establish a university in Nakhon Ratchasima on 13 September 1988, with the then Permanent Secretary of University Affairs(Professor Dr. Wichit Srisa-an) chairing the Committee. The Committee proposed the Suranaree University of Technology Founding Project to The Royal Thai Government and submitted a draft of the University Founding Bill to the Parliament in 1989. His Majesty the King signed the Bill on 27 July 1990. The Law was published in the Royal Gazette, effective from 30 July 1990. Hence, Suranaree University of Technology holds 27 July 1990 as its founding date.

2 Pledge and Missions

SUT was established with the goals of promoting administrative efficiency and academic freedom, and to be a community of scholars in arts,

sciences, and technology. It pledges to pursue excellence in all missions, to bear fruit in the collection and celebration of knowledge and wisdom for the eternal growth of humankind.

SUT pursues five missions as follows:

1. Producing and training highly qualified science and technology personnel in response to Thailand's developmental needs.
2. Undertaking research and development: advancing academics and using research and development results in enhancing Thailand's growth.
3. Fostering technology adaptation and transfer: to help Thailand become more technologically self reliant.
4. Providing academic service for the public and various bodies, both state and private.
5. Enhancing cultural heritage, both at the national and regional level, especially the art and culture of Thailand's Northeast.

In this period of globalization and accelerating societal and technological changes combined with the economic crisis, SUT has committed to develop strategic alliances with its stake holders. Co-operation with industries is one such strategy. University - Industry co-operation has played an important role in the development of SUT as will be seen in this paper. There are many reasons for this. First, the instruction function of the university can benefit from the close relation with industry through involvement of the industry professionals in the development of curriculum and the delivery of instruction and the involvement of the faculty in the industrial projects to make the teaching/learning strategy more relevant to the industrial needs, one of the important objectives of SUT programmes and through the involvement of the students in the industries to make them better qualified for the world of work. Second, the research function of the university can benefit from co-operation with industry to make research more relevant to the needs of the society, in addition to bringing additional resource, benefitting both the university and the industry. Third, the services function of the university gets performed better through consultancies, and programmes of assistance to the small and medium sized industries in their various academic and technical needs.

University- Industry cooperation can make better use of resources and achieve economy on both sides at this time of financial crisis.

SUT's system of governance is developed to promote university-industry co-operation. Indeed, one of the principal modes of achieving its mission is to co-operate with the community where it is located as will be seen through its deviation from traditional means of curriculum development, admission procedures, teaching /learning strategy and evaluation of its programmes.

The University is governed by a Council in which the Presidents of the Council for Industries of Thailand and the Thai Chamber of Commerce are Ex- Officio members to oversee, advise on and facilitate cooperation with industries. The organizational structure of SUT has been designed in such a way that it can promote University-Industry cooperation .

3 Educational System and Programs:

SUT uses the trimester credit-hour system, with curricula approved by Ministry of the University Affairs, comprising about 174-175 credit hours per program. Students must also fulfill two trimesters of Cooperative Education.

Undergraduate Programs

Among the Bachelors' Degrees Programs offered are:

1.Crop Production Technology
2.Animal Production Technology
3.Food Technology
4.Agricultural Engineering
5.Mechanical Engineering
6.Electrical Engineering
7.Civil Engineering
8.Industrial Engineering
9.Telecommunication Engineering
10.Transportation Engineering
11.Computer Technology
12.Chemical Engineering
13.Environmental Engineering
14.Metullurgical Engineering
15.Geotechnology
16.Polymer Technology
17.Ceramic Engineering

18.Information Technology

Graduate Programs:

1.Applied Mathematics
2.Remote Sensing
3.Physics
4.Chemistry
5.Crop Production Technology
6.Animal Production Technology
7.Biotechnology
8.Environmental Biology
9.Environmental Engineering
10. English Language Studies

4 Admissions, number of students and staff

SUT's admission of first year students in the normal program follows two procedures: the quota system, through which the university admits 80% without any exams; and the national entrance examination, administered by the Ministry of University Affairs, through which 20% are admitted. The quota system is divided into two categories: 25% of the total intake are part of the local school quota and the remaining 55% are part of the provincial quota. The school quota is allocated to all high schools in 8 provinces in SUT's jurisdiction, according to the proportion of the size of each graduating class. The provincial quota, on the other hand, is allocated to the remaining provinces of Thailand.

5 Services:

1. Student dormitories, equipped with drafting and computer rooms and many other conveniences.
2. Financial aid, for the economically disadvantaged student.
3. Guidance and Career Services.
4. Health services.
5. Sports facilities.
6. Communications services: telephone, fax, satellite communications services, electronic mail services.
7. Banking services.
8. Transportation on campus, free of charge.

6 International Cooperation as a means to facilitate university-industry cooperation, the preparatory phase

SUT linked with the international community in teaching, research, and other forms of international cooperation, as well as through membership in international organizations/associations to learn from good practices in the field of university-industry co-operation. Recognizing the importance and necessity of Thai institutions of higher learning to increase their roles both regionally and globally, the University has placed high priority on fostering sound relationships and substantive technical cooperation with institutions of higher education abroad in this area.

6.1 International Academic Cooperation

As of 1998, Suranaree University of Technology has signed agreements with the following academic institutions which have been known to have good programmes of university-industry cooperation:

AUSTRALIA

Edith Cowan University, Australia: A three-way cooperation between Suranaree University of Technology, Sahaviriya OA Public Company, Ltd., and ECU; for interactive multimedia software research and development in the form of hypertext on high speed computers, linking and transferring information technology between SUT and ECU, another component to actualize the cooperation between the Thai business and industrial sectors and the Australian counterparts.

CANADA

The Canadian Universities of Technology Consortium (CUTC) consisting of the Technical University of Nova Scotia(now DalTech Dalhousie University), University of Waterloo, Ryerson Polytechnic University, and the University of Guelph, with academic cooperation at all levels, emphasizing curriculum and educational development, student exchange; research; work tours and training; as well as to promote Suranaree University of Technology's cooperation with industry.

University of Guelph: Personnel visits and exchanges, cooperative research, degree training, student exchange, and exchange of academic material.

University of Regina: Joint educational and research activities, exchange of academic material, exchange of faculty members, exchange of graduate and undergraduate students, exchange of cooperative students (industry placed), organization of joint academic and scientific conferences.

College of Agriculture, University of Saskatchewan: Exchange of students in the fields of Food Science, Horticulture Science, Agronomy, Animal and Poultry Science, Soil Science, Plant Ecology and other areas of study.

CHINA

Guizhou University: Research projects of mutual interest, exchange of staff members and students, cooperation and exchange of other fields under AUAP.

FINLAND

Center for International Mobility (CIMO): Exchange of students in the fields of Engineering, Food Technology, Animal Production, Horticulture, Agronomy, Science, Language, Hotel and Tourism, Food and Beverage, and other areas of interest.

FRANCE

The International Space University (ISU): An interdisciplinary, intercultural and international institution preparing individuals to respond to the current needs and the increasing and evolving demands of the space sector in a rapidly changing world. "The purpose of the Association shall be the establishment of an international institution of higher learning, dedicated to the development of outer space for peaceful purposes through international and multidisciplinary education and research programs" (From "ISU By-Laws Article 2.1"). **SUT has won the bid for hosting the ISU Summer Session Program '99 from 26 June-4 September, 1999. This will further enhance SUT's capacity of co-operation with space industry in the future.**

JAPAN

University of Tsukuba: Academic exchange and cooperation, exchange of professors and research scholars, exchange of students, and organization of joint research and scientific meetings, exchange of scientific documents, publications and information.

PHILIPPINES

Technical University of the Phlippines, Pangasinan University, University of San Carlos, Mindanao State University, and Angeles University: Cooperation in Engineering, environment, multimedia education, exchange visits of faculty and students.

Angeles University Foundation: Cooperation in improvement of faculty members through scholarships, grants, seminars, workshops, symposia, etc., exchange of research publications, joint research, higher education in the 21 century.

UNITED KINGDOM

The University of Edinburgh, UK: Graduate studies cooperation in engineering, biochemistry, microbiology, remote sensing, and laser technology and photonics, as well as promoting cooperation in research and development; personnel, faculty and student exchange; and laboratory training and experience.

The University of Birmingham, UK: Academic exchange and cooperation in teaching and research in electrical engineering, environmental biology, and biotechnology.

USA

National Technological University (NTU), USA: Cooperation in borderless education or virtual campus through satellite programs, especially at graduate level.

The University of Maryland, USA: Cooperation in graduate studies in laser technology, promoting and developing research, student and faculty exchange, and general academic cooperation.

6.2 International Organization/Association Membership and Involvement to create the knowledge base for university-industry cooperation

International organization/association membership facilitates SUT' s U-I programmes as part of the regional and international academic network. Among the organizations of which SUT is a member are:

Association of Universities of Asia and Pacific (AUAP) serves as the hub for academic cooperation and exchange between members in response to local educational needs. Suranaree University of Technology has hosted the Association Secretariat Office and SUT's Rector served as the AUAP's first President in the 1996 academic year.

International Association of Universities (IAU): An academic association serving as a source of information as well as an academic database for its members; as a hub for academic cooperation. Co-organized by SUT, the conference on "Universities' Responsibility to Society" was held at Chulalongkorn University on 12 - 14 November 1997. *The conference deliberations included the mechanisms of university-industry cooperation.

Association of Southeast Asian Institutions of Higher Learning (ASAIHL): An Association formed by the Rectors of 8 state universities in South East Asia, emphasizes activities leading to academic excellence in education, research, and community service, by serving as a center for information exchange through meetings and seminars.

World Association for Co-operative Education (WACE): An Association that aims to strengthen ties between education and industry working in the format of co-operative education. A biannual meeting is held to exchange information, with the Rector of Suranaree University of Technology serving as a member of the Association's administrative committee. **SUT has won the bid for hosting The 13th World Congress on Cooperative Education in the year 2001.**

UNESCO-UNISPAR: The UNESCO University-Industry and Science Partnership sponsors seminars, workshops and conferences on the promotion of university-industry linkages. SUT either bilaterally or in conjunction with AUAP has co-organized with UNESCO-UNISPAR regional workshops promoting university-industry partnerships.

More importantly, SUT has introduced and implemented the four major units that help create a learning atmosphere and continuous improvements in the organisation. They are Teachers and Staff Performance Evaluation, Teaching Efficiency Development, Quality Assurance, and Research and Development.

Above all else, through its previous and present Rectors, SUT has been involved in several international organizations, such as, The Asian Association of Open Universities(AAOU), The International Council for Distance Education(ICDE), The International Council on Education for Teaching(ICET), The Council on International Educational Exchange(CIEE), The Universities Without Walls International Council(UWC), United Nations University. Such involvement brings to SUT, experiences of good practices in higher education including university- industry cooperation from around the world as SUT contributes to the world stock of new body of knowledge in this important field.

All of these are the indicators of SUT as an example of a continuous learning organisation.