

# Perception of Top Level Knowledge Workers on Productivity Improvement through Tools and Techniques

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## Abstract

Improving productivity of knowledge workers is one of the major challenges in today's global environment. Through exploratory research, effort has been made to identify various tools & techniques those can improve productivity of knowledge workers. Through survey, effort has been made to find out perception of top level scientists on - usefulness of various tools & techniques; use of these tools & techniques and encouragement given in organisations for acquiring skill in these; trainings given for these tools & techniques and relative importance given by scientists for these tools & techniques.

Questionnaires have been designed and given to select scientists at top level to find out their perception on various aspects indicated above, followed by interview where responses were not adequate or further clarifications were required. Scientists have indicated that most of the identified tools & techniques can improve their productivity and these are used in organisations or scientists are encouraged to acquire skill in the same and majority of them are presently not trained in these tools & techniques. They also indicated the relative importance of various tools & techniques. The extensive use of these tools & techniques and provision of trainings to the scientists in these can improve their productivity.

**Keywords:** Knowledge Management, Team Building, Executive Education, Leadership Development, Transcendental Meditation, Stress Management, Transactional Analysis, Sleep Management, Benchmarking, Succession Planning



## **1. Introduction**

Improving productivity of knowledge worker is one of the major challenges for the companies in today's global environment. An effort has been made here through exploratory research to identify tools & techniques those can improve the productivity of knowledge workers; to find out perception of top level scientists through survey on - the usefulness of various tools & techniques; use of these tools & techniques and encouragement given for acquiring skill in these in organisations; trainings given for these tools & techniques and relative importance given by the top level scientists for these tools & techniques. The study has been carried out as part of the doctoral research work by the author on 'Knowledge Worker Productivity Improvement Processes, Technologies & Techniques in Defence R&D Laboratories – An Evaluative Study.'

## **2. Tools and techniques for productivity improvement**

Exploratory research has been carried out to find out the various processes, technologies, tools & techniques those can improve the productivity of the knowledge workers. Thirty six processes, technologies, tools & techniques have been identified and the study on ten important tools & techniques out of these has been discussed below.

- (i) Knowledge Management,
- (ii) Executive Education,
- (iii) Leadership Development,
- (iv) Benchmarking,
- (v) Transcendental Meditation,
- (vi) Stress Management,
- (vii) Transactional Analysis,
- (viii) Sleep Management,
- (ix) Team Building and
- (x) Succession Planning.

A brief description of each of these tools & techniques and how these can improve the productivity of knowledge workers are discussed below.

### **(a) Knowledge management (KM)**

Knowledge Management is a process that, continuously and systematically, transfers knowledge from individuals and teams, who generate them, to the brain of the organisation for the benefit of the entire organisation. It is the systematic, explicit, and deliberate building, renewal, and application of knowledge to maximize an enterprise's knowledge-related effectiveness and returns from its knowledge assets. The central theme of Knowledge

Management is to leverage and reuse knowledge resources that already exist in the organization so that people will seek out best practices rather than reinvent the wheel.

Knowledge Management can be defined as:

(i) Capturing, storing, retrieving and distributing tangible Knowledge Assets such as copyrights, patents and licenses.

(ii) Gathering, organizing and disseminating intangible knowledge, such as professional know how and expertise, individual insight and experience, creative solutions and the like, brands and technology.

(iii) Creating an interactive learning environment where people readily transfer and share what they know, internalize it and apply it to create new knowledge. ([http://www.tatasteel.com/technologyupdate/km/km\\_basics.htm](http://www.tatasteel.com/technologyupdate/km/km_basics.htm))

Knowledge Management comprises a range of practices used by organisations to identify, create, represent, distribute and enable adoption of insights and experiences. Such insights and experiences comprise knowledge, either embodied in individuals or embedded in organisational processes or practice. ([http://en.wikipedia.org/wiki/Knowledge\\_management](http://en.wikipedia.org/wiki/Knowledge_management))

The tacit knowledge is often subconscious, internalised, and the individual may or may not be aware of what he or she knows and how he or she accomplishes particular results. Explicit knowledge is the visible knowledge available in the form of letters, reports, memos, books, literatures, drawings, etc. Explicit knowledge can be embedded in objects, rules, systems, methods etc. Tacit knowledge is what is in our heads, and explicit knowledge is what we have codified.

Knowledge may be accessed at three stages - before, during, or after knowledge-related activities. A successful KM programme needs, on the one hand, to convert internalised tacit knowledge into explicit codified knowledge in order to share it, but, on the other hand, it also must permit individuals and groups to internalise and make personally meaningful codified knowledge they have retrieved from the KM system.

Knowledge Management enablers are expert systems, knowledge bases, various types of Information Management software, help desk tools, document management systems and other IT systems supporting organisational knowledge flows. Internet brought with it further enabling technologies, including e-learning, web conferencing, collaborative software, content management systems, corporate 'Yellow pages' directories, email lists, wikis, blogs, and other technologies. An effective KM programme can help a company to foster innovation by encouraging the free flow of ideas and thoughts and to improve the productivity of knowledge workers.

### **(b) Executive education**

Executive education programme was developed in the U.S. in the early 20th century as a way to strengthen the management skills of senior executives. ([http://en.wikipedia.org/wiki/Executive\\_Education](http://en.wikipedia.org/wiki/Executive_Education)). Executive education is imparted to

strengthen the management skills of Chief Executives and other top executives. To-day, companies are looking for Head of Technology Departments who deeply understand technology yet are as capable of helping to set business strategy as they are at running the technology department. The problem is, most trained technologists have little or no training in finance, marketing, operations, negotiation, or that most basic of executive-level skills and corporate politics. Executive education can help with these strategic and tactical responsibilities. If executive education can teach a Technology Head to expand his purview to business and industry without abandoning his technology responsibilities, the Technology Head can improve all aspects of the business, from product development, sales and quality control to market research or investor relations.

### **(c) Leadership development**

In organizational development, leadership development is the strategic investment in, and utilization of, the human capital within the organization. David Day (2000) distinguished between leader versus leadership development. Leader development focuses on the development of the leader, such as the personal attributes desired in a leader, desired ways of behaving, ways of thinking or feeling.

In contrast, leadership development focuses on the development of leadership as a process. This will include the interpersonal relationships, social influence process, and the team dynamics between the leader and his/her team at the dyad level, the contextual factors surrounding the team such as the perception of the organizational climate and the social network linkages between the team and other groups in the organization. Leadership development can build on the development of individuals to become leaders. In addition, it also needs to focus on the interpersonal linkages between the individuals in the team.

### **(d) Benchmarking**

Which company is the best in the industry? Which one has the best sales organization, the best customer service department, the leanest manufacturing operation? Which one is setting the standard? And what is that standard? How did that company become the best? And what do other companies have to do to equal it? That's what benchmarking is all about. It's a critical component in terms of monitoring a company's success in attaining strategic objectives and it assists in the assessment of operations issues that support those objectives.

Benchmarking is the process of comparing the business processes and performance metrics including cost, cycle time, productivity, or quality to another that is widely considered to be an industry standard benchmark or best practice. (<http://en.wikipedia.org/wiki/Benchmarking>). There is no single benchmarking process that has been universally adopted. The following is an example of a typical procedure:

- Identify your problem areas,
- Identify other industries that have similar processes,
- Identify organizations that are leaders in these areas,

- Survey companies for measures and practices,
- Visit the "best practice" companies to identify leading edge practices and
- Implement new and improved business practices.

#### **(e) Transcendental meditation**

Transcendental Meditation (TM) technique is a simple, natural, effortless procedure practised for 15-20 minutes in the morning and evening while sitting comfortably with the eyes closed. During this technique, the individual's awareness settles down and he experiences a unique state of restful alertness. (<http://www.maharishi-india.org/programmes/p8/tmbusiness.html>). The body of the individual becomes deeply relaxed. Transcendental meditation technique is scientific. It helps to dissolve accumulated stress and fatigue through the deep rest gained during the practice. This experience enlivens the individual's creativity, dynamism, orderliness, and organising power, which result in increasing effectiveness and success in daily life.

The following are the advantages of transcendental meditation:

(i) Intelligence Growth, (ii) Increased Creativity, (iii) Broader Comprehension, (iv) Improved Perception, (v) Greater Orderliness, (vi) Improved Academic Skills, (vii) Improved Intellectual Performance, (viii) Increased Productivity, (ix) Decreased Drug Abuse, (x) Self Actualization, (xi) Increased Relaxation, (xii) Increased Energy Level, (xiii) Greater Appreciation of Others, (xiv) Increased Self-Esteem, (xv) Lower Blood Pressure, (xvi) Improved Health, (xvii) Reduced Anxiety, (xviii) Reduced Medical Care, (xix) Decreased Stress, (xx) Reversal of Aging, (xxi) Improved Quality of Life and (xxii) Reduced Conflict.

#### **(f) Stress management**

Stress management helps us to focus our attention on the most serious sources of stress in our life, so that we work on bringing these under control. Stress is a condition or feeling experienced when a person perceives that demands exceed the personal and social resources the individual is able to mobilize. ([http://www.mindtools.com/pages/article/newTCS\\_00.htm](http://www.mindtools.com/pages/article/newTCS_00.htm)). Most of the stress comes from things like work overload, conflicting priorities, inconsistent values, over-challenging deadlines, conflict with co-workers, unpleasant environments and so on. Not only do these reduce our performance as we divert mental effort into handling them, they can also cause a great deal of unhappiness.

There are two types of instinctive stress response - "Fight-or-Flight" response and the long-term "General Adaptation Syndrome". The first is a basic survival instinct, while the second is a long-term effect of exposure to stress. A third mechanism comes from the way that we think and interpret the situations in which we find ourselves.

In case of "Fight-or-Flight" response, when we experience a new challenging situation, we quickly release hormones that help us to survive. These hormones help us to run faster and fight harder. Unfortunately, this mobilization of the body for survival also has negative consequences. In this state, we are excitable, anxious, jumpy and irritable. This reduces our

ability to work effectively with other people. Hans Selye identified a general response (the “General Adaptation Syndrome”) with which the body reacts to a major stimulus. While the “Fight-or-Flight” response works in the very short term, the “General Adaptation Syndrome” operates in response to longer-term exposure to causes of stress.

The third mechanism – “the way that we think” and interpret the situations can result in stress. In becoming stressed, we firstly must feel threatened by the situation and secondly we must doubt our capabilities and resources to meet the threat.

‘Fight-or-Flight response’, ‘General Adaptation Syndrome’ and ‘the way that we think and interpret’ response can fit together into one response. The mental stress triggers the fight-or-flight response, and that if this stress is sustained for a long time, the end result might be exhaustion and burnout.

The followings are the various methods to reduce stress:

(i) *The Schedule of Recent Experience (SRE)* is a useful technique for understanding the long term stress that we are experiencing.

(ii) *Stress Diary* is useful for understanding the causes of short-term stress in our life. It also gives us an insight into how we react to stress.

(iii) *Managing Stress With Rational Thinking* - In many cases, situations do not cause all of the stress that we experience. Sometimes, our reaction to circumstances contributes to the stress we experience.

(iv) *Stress SWOT Analysis* helps us to understand our unique position with respect to stress management. By looking at strengths, we ensure that we recognize all of the personal strengths, skills, resources and social networks that can help us manage stress.

(v) *Stress Management Plan* helps us to focus our attention on the most serious sources of stress in our life, so that we work on bringing these under control.

### **(g) Transactional analysis**

Transactional Analysis has wide applications in clinical, therapeutic, organizational and personal development, encompassing communications, management, personality, relationships and behaviour. (<http://www.businessballs.com/transact.htm>). Transactional analysis helps us to understand what is going on and to decide what ego states to adopt, which signals to send and where to send them for effective communications. This enables us to make the most of all our communications and therefore create, develop and maintain better relationships. Thomas Harris's highly successful popular work, *I'm OK, You're OK* is largely based on Transactional Analysis.

Eric Berne recognized that people can interact from one of the three "ego-states" - Parent, Adult or Child. The Parent's is a language of values, the Adult's is a language of logic and rationality and the Child's is a language of emotions. There are two forms of Parent we can play. The *Nurturing Parent* is caring and concerned and often may appear as a mother-figure. The *Controlling Parent*, on the other hand, tries to make the Child do as the parent wants



them to do. The Adult in us is the 'grown up' rational person who talks reasonably and assertively, neither trying to control nor reacting. There are three types of Child we can play. The *Natural Child* is largely un-self-aware and is characterized by the non-speech noises they make (yahoo, etc.). They like playing and are open and vulnerable. The cutely named *Little Professor* is the curious and exploring Child who is always trying out new stuff. Together with the Natural Child they make up the Free Child. The *Adaptive Child* reacts to the world around them, either changing themselves to fit in or rebelling against the forces they feel. Effective functioning in the world depends on the availability of all three, intact ego states.

### **(h) Sleep management**

Sleep Management helps us to overcome insomnia & sleep disorders, increase physical & mental energy, reduce stress & anxiety, enhance self-esteem, bolster immune system and improve physical fitness (Bourke, 1992).

Essentially, the longer we go without sleep, the poorer our performance on any number of tasks. In general, we can sustain normal performance without noticeable impairment (the Green zone) for about 16 hours after waking up. After 16 hours without sleep, we begin to see a noticeable decrease in our performance (the Amber zone). By the time we have been awake for 24 hours, our reaction time is worse than if we were legally intoxicated. After 28 hours without sleep, our performance becomes significantly impaired with the likelihood of critical errors rising to an unacceptable level (the Red zone).

To sustain performance, we need at least 6 hours and preferably 7-8 hours of sleep out of every 24 hours. Less sleep than this and our performance will degrade over time. Getting 4-6 hours of sleep every 24 hours will keep us in the Amber zone (where the risk for mission critical errors is increased but still at acceptable levels) for periods of up to several weeks. Getting less than 4 hours of sleep will keep us in the Red Zone (where the risk for mission critical errors is unacceptably high). Sleep doesn't have to be continuous to be effective. While it is preferable to give us uninterrupted sleep time, several shorter sleep periods that add up to between 6 and 8 hours will likely be adequate.

Our performance begins to suffer as soon as we start losing sleep. If we are struggling to stay awake, then our ability to function is already impaired. If sleep loss can not be avoided, we should use caffeine – drink the equivalent of two cups of coffee (200 mg of caffeine) every 2 to 4 hours. Use of caffeine as described above will help maintain performance even in the face of moderate sleep loss.

Sleep management can overcome insomnia and other seemingly unmanageable sleep disorders, increase our physical and mental energy, reduce stress and anxiety, enhance our self-esteem, bolster our immune system and we become more physically fit

### **(i) Team building**

Team building helps us to utilize the diversity of skills and personalities, use their strengths and compensate for others' weaknesses. Team building skills are critical for one's effectiveness as a manager or entrepreneur. A team is successful when it accomplishes something much bigger



and works more effectively. The first factor in team effectiveness is the diversity of skills and personalities. When people use their strengths in full, but can compensate for each other's weaknesses. When different personality types balance and complement each other. The other critical element of team work success is that all the team efforts are directed towards the same clear goals, the team goals. This relies heavily on good communication in the team and the harmony in member relationships. (<http://www.time-management-guide.com/team-building.html>)

The following are the factors that influence Team motivation: (i) Purpose, (ii) Challenge, (iii) Camaraderie, (iv) Responsibility, (v) Growth and (vi) Leadership.

The following seven elements are found in a high performance teams: (i) Commitment, (ii) Contribution, (iii) Communication, (iv) Cooperation, (v) Conflict Management, (vi) Change Management and (vii) Connections.

### **(j) Succession planning**

In organizational development, succession planning is the process of identifying and preparing suitable employees through mentoring, training and job rotation, to replace key players, such as, the Chief Executive Officer (CEO) within an organization as their terms expire (Yummy, 1984). Succession planning involves having senior executives periodically review their top executives and those in the next lower level to determine backups for each senior position. This is important because it often takes years of grooming to develop effective senior managers. There is a critical shortage of middle and top leaders in companies. Organizations will need to create pools of candidates with high leadership potential.

A succession plan clearly sets out the factors to be taken into account and the process to be followed in relation to retaining or replacing the person. Business succession planning involves planning for the smooth continuation and success of a business which depends greatly on the availability of competent people. What is likely to happen to the organization when a key leader is eliminated without succession planning in place? In an unplanned situation, ineffective quick-fixed solutions are the only answers left. If no able successor can be found, a temporary replacement is often the only choice left, and the ultimate result may still be the downfall of the organization. Without succession planning, a business that has become successful can just as easily fall.

### **3. Research design**

The questionnaires & interview techniques were adopted for conducting the research. The research was part of the doctoral research work by the author on 'Knowledge Worker Productivity Improvement Processes, Technologies & Technologies in Defence R&D Laboratories – An Evaluative Study'.

The structured questionnaires were given to the select senior level scientists of six Defence R&D Laboratories, based in Hyderabad, India. The survey was conducted to find out the perception of the scientists on the following aspects:

(a) The usefulness of various identified tools & techniques in labs;

- (b) The use & encouragement given by labs for each of these tools & techniques;
- (c) The trainings given to the scientists for each of these tools & techniques and
- (d) The relative importance given by the scientist for each of these tools & techniques for improving the productivity of knowledge worker.

The questionnaires developed and given to select junior level scientists on the above aspects for their responses are given below.

***(A) Questionnaires on profile of the scientist***

The scientists were asked to indicate the following details about them.

- (i) Age
- (ii) Educational qualifications:
- (iii) Areas of work:
- (iv) Work experience (in years):

***(B) Questionnaires on tools & techniques***

The scientists were asked to select any one of the choices on the right side of the questionnaires by ticking on the same, for each of the tools & techniques, each having three questionnaires as follows.

**(a) Knowledge Management** comprises a range of practices used by organisation to identify, create, represent, distribute and enable adoption of what it knows, and how it knows it.

(i) In our Lab, we have Knowledge Management System as: - Formal/Informal/Not at all/Can't say

(ii) Knowledge Management helps to improve the productivity of our senior scientists.

- Yes/No/Can't say

(iii) We train our Scientists in Knowledge Management.

- Yes/No/Can't say

**(b) Executive Education** is imparted to strengthen the management skills of Chief Executives and other top executives.

(i) Scientists are encouraged to go for Executive Education.

- Yes/No/Can't say

(ii) Executive Education helps to improve the productivity of our senior scientists.

- Yes/No/Can't say

(iii) We sponsor our Scientists for Executive Education.

- Yes/No/Can't say

**(c) Leadership Development** focuses on development of personal attributes desired in a leader, desired ways of behaving, ways of thinking or feeling.

(i) We encourage our scientists for Leadership Development.

- Yes/No/Can't say

(ii) Leadership development programme helps to improve the productivity of our scientists.

- Yes/No/Can't say

(iii) We train our Scientists in Leadership development.

- Yes/No/Can't say

**(d) Benchmarking** is the process of comparing the cost, time, quality, etc. of what one organization does against what another organization does.

(i) In our Lab, we have Benchmarking studies as:

- Formal/Informal/Not at all/Can't say

(ii) Benchmarking process helps to improve the productivity of our scientists.

- Yes/No/Can't say

(iii) We train our Scientists in Benchmarking technique.

- Yes/No/Can't say

**(e) Transcendental Meditation** - During Transcendental Meditation, the individual's awareness settles down, he experiences a unique state of restful alertness and his body becomes deeply relaxed.

(i) We encourage our scientists to develop skill in Transcendental Meditation.

- Yes/No/Can't say

(ii) Transcendental Meditation helps to improve the productivity of our scientists.

- Yes/No/Can't say

(iii) We train our Scientists in Transcendental Meditation.

- Yes/No/Can't say

**(f) Stress Management** helps us to focus our attention on the most serious sources of stress in our life, so that we work on bringing these under control.

(i) Our scientists are encouraged to develop skill in Stress Management.

- Yes/No/Can't say

(ii) Stress Management helps to improve productivity of our scientists.

-Yes/No/Can't say

(iii) We train our Scientists in Stress Management.

- Yes/No/Can't say

**(g) Transactional Analysis** helps us to understand what is going on and to decide what ego states to adopt, which signals to send and where to send them for effective communications.

(i) We encourage our scientists to develop skill in Transactional Analysis.

- Yes/No/Can't say

(ii) Transactional Analysis helps to improve the productivity of our scientists through personal development, encompassing communications, management, personality, relationships and behaviour. —

Yes/No/Can't say

(iii) We train our Scientists in Transactional Analysis.

- Yes/No/Can't say

**(h) Sleep Management** helps us to overcome insomnia & sleep disorders, increase physical & mental energy, reduce stress & anxiety, enhance self-esteem, bolster immune system and improve physical fitness.

(i) We encourage our scientists to develop skill in Sleep Management.

- Yes/No/Can't say

(ii) Sleep Management helps to improve the productivity of our scientists.

- Yes/No/Can't say

(iii) We train our Scientists in Sleep Management.

- Yes/No/Can't say

**(i) Team Building** helps us to utilize the diversity of skills and personalities, use their strengths and compensate for other's weaknesses.

(i) In our Lab, we have Team Building technique as: - Formal/Informal/Not at all/Can't say

(ii) Team Building skills help to improve the productivity of our scientists.

- Yes/No/Can't say

(iii) We train our Scientists in Team Building.

- Yes/No/Can't say

**(j) Succession Planning** is the process of identifying and preparing suitable employees through mentoring, training and job rotation, to replace key players as their terms expire.

(i) In our Lab, we have Succession Planning as:

- Formal/Informal/Not at all/Can't say

(ii) Succession Planning helps to improve the productivity of our scientists.

- Yes/No/Can't say

(iii) We train our Scientists in Succession Planning.

- Yes/No/Can't say

***(C) Questionnaires on relative importance given for each of the tools & techniques***

The scientists were asked to assign the value 1 to 5, for the following tools & techniques based on the relative importance of the same (1 is the most important, followed by 2, 3, 4 & 5 and 5 is the least important) for improving the productivity of knowledge worker.

(i) Knowledge Management ( )

(ii) Executive Education ( )

(iii) Leadership Development ( )

(iv) Benchmarking ( )

(v) Transcendental Meditation ( )

(vi) Stress Management ( )

(vii) Transactional Analysis ( )

(viii) Sleep Management ( )

(ix) Team Building ( )

(x) Succession Planning ( )

***(D) Data collection & data analysis***

The questionnaires were given to twenty percent select top level scientists, from six Defence R&D Laboratories based in Hyderabad India. After going through the responses, if it was found to be inadequate or there was a need for further clarifications, the concerned scientists were interviewed by the author to get the required clarifications. The data was transferred from each response sheet to MS excel sheet in Personal Computer. Each scientist was given a code number and the code number was used to compile the data. The MS excel software was used for analyses of the data. The reporting on the findings is presented in simple running matter, in third person on each of the aspects taken up for the study.

#### **4. Findings**

The findings on the various parameters are as follows:

***(A) Profile of the scientists***

(i) Top level scientists are in the age group of 44 - 60 years.

(ii) 14.3 % of them have got educational qualifications as BE & BTech, 4.8 % have got MSc, 38.1 % have got ME & MTech and 42.8 % have got PhD.

(iii) They have been working in the areas of Research, Design, Development, Manufacture, Fabrication, Integration, Inspection, Testing, Quality Assurance, Project Management, Programme Management and Technology Management.

(iv) They have got 24 - 39 years of work experience.

***(B) Tools & techniques those help to improve productivity of knowledge worker***

From the findings on tools & techniques, those help to improve the Productivity of Knowledge Workers in Labs, the following are the observations:

(a) 100% Scientists agree that Knowledge Management helps to improve the productivity of Scientists.

(b) 95% Scientists agree that Team Building helps to improve the productivity of Scientists.

(c) 85% Scientists agree that Succession Planning helps to improve the productivity of Scientists.

(d) 70% Scientists agree that Executive Education and Stress Management help to improve the productivity of Scientists

(e) 55% Scientists agree that Leadership Development, Transcendental Meditation and Benchmarking help to improve the productivity of Scientists.

(f) 40% Scientists agree that Transactional Analysis helps to improve the productivity of Scientists.

(g) 35% Scientists agree that Sleep Management helps to improve the productivity of Scientists.

***(C) Use of various tools & techniques and encouragement given for the same in labs***

From the findings on use of tools & techniques in Labs & encouragement given for acquiring skills in the same, the following are the observations:

(a) 90% Scientists agree on use of & encouragement given for acquiring skills in Knowledge Management.

(b) 80% Scientists agree on use of & encouragement given for acquiring skills in Team Building.

(c) 75% Scientists agree on use of & encouragement given for acquiring skills in Executive Education.

(d) 55% Scientists agree on use of & encouragement given for acquiring skills in Leadership Development.

- (e) 50% Scientists agree on use of & encouragement given for acquiring skills in Stress Management and Succession Planning.
- (f) 45% Scientists agree on use of & encouragement given for acquiring skills in Benchmarking.
- (g) 25% Scientists agree on use of & encouragement given for acquiring skills in Transcendental Meditation.
- (h) 15% Scientists agree on use of & encouragement given for acquiring skills in Transactional Analysis.
- (i) No Scientist agrees on use of & encouragement given for acquiring skills in Sleep Management.

***(D) Trainings given for various tools & techniques in labs***

From the findings on trainings given for various tools & techniques in Labs, the following are the observations:

- (a) 65% Scientists agree that trainings are given for Executive Education in Labs.
- (b) 45% Scientists agree that trainings are given for Team Building in Labs.
- (c) 30% Scientists agree that trainings are given for Knowledge Management, Leadership Development and Stress Management in Labs.
- (d) 20% Scientists agree that trainings are given for Benchmarking and Succession Planning in Labs.
- (e) 15% Scientists agree that trainings are given for Transactional Analysis in Labs and
- (f) 10% Scientists agree that trainings are given for Transcendental Meditation in Labs.
- (g) No Scientist agrees that trainings are given for Sleep Management in Labs.

***(E) Relative importance of various tools & techniques***

The Scientists were asked to assign a value 1 to 5 based on the relative importance of the tool & technique (1 is the most important and 5 is the least important). The values assigned for each tool and technique, were added up to get the total score for each tool & technique. The ranking was assigned for each tool & technique, based on the total score for each. In case the total score is the lowest, the ranking assigned is 1 (the highest), and if the total score is the highest, the ranking assigned is 10 (the lowest). Similarly for other tool & technique, ranking has been assigned from 2 to 9, based on the total score. The tools & techniques are arranged below in descending order based on their relative importance.

- (i) Team Building,
- (ii) Leadership Development,
- (iii) Executive Education,



- (iv) Knowledge Management,
- (v) Stress Management,
- (vi) Benchmarking,
- (vii) Transactional Analysis,
- (viii) Succession Planning,
- (ix) Transcendental Meditation,
- (x) Sleep Management.

## **5. Discussion**

The main objectives of the study were to find out the following:

- (i) To identify tools & techniques those can improve the productivity of knowledge workers.
- (ii) To find out the perception of scientists through survey on:
  - (a) The usefulness of various identified tools & techniques in labs;
  - (b) The use & encouragement given by labs for each of these tools & techniques;
  - (c) The trainings given to the scientists for each of these tools & techniques and
  - (d) The relative importance given by the scientist for each of these tools & techniques for improving the productivity of knowledge worker.

Improving productivity of knowledge workers is one of the major challenges for the organisations in today's global environment. Through exploratory research, tools & techniques have been identified those can improve the productivity of knowledge workers. Through survey, the perception of scientists have been found out on - the usefulness of various tools & techniques; use of these tools & techniques in organisations and encouragement given for acquiring skill in these; trainings given for these tools & techniques and relative importance given by the scientists for these tools & techniques.

The summary of results is presented below:

- (i) From the findings at Para 3(B), it is observed that 55% - 100% scientists indicated that Leadership Development, Transcendental Meditation, Benchmarking, Executive Education, Succession Planning, Team Building and Knowledge Management help to improve the productivity of scientists. Scientists in lesser number (35% - 40%) indicated that Sleep Management and Transactional Analysis help to improve the productivity of scientists. It can be inferred that majority of the scientists have indicated that most of the identified tools & techniques can improve the productivity of knowledge workers.
- (ii) From the findings at Para 3(C), it is observed that 50% - 90% scientists indicated that Stress Management, Succession Planning, Leadership Development, Executive Education, Team Building and Knowledge Management are used in labs or scientists are encouraged to

acquire skill in the same. Scientists in lesser number (15% - 45%) indicated that Transactional Analysis, Transcendental Meditation and Benchmarking are used in labs or scientists are encouraged to acquire skill in the same. All Scientists have indicated that Sleep Management is not used in labs or scientists also are not encouraged to acquire skill in the same. It can be inferred that the majority of the scientists have indicated that most of the identified tools & techniques except Sleep Management are used in labs or scientists are encouraged to acquire skill in the same.

(iii) From the findings at Para 3(D), it is observed that 65% scientists have indicated that scientists are trained in Executive Education in Labs. Scientists in lesser number (10% - 45%) indicated that scientists are trained in Transcendental Meditation, Transactional Analysis, Benchmarking, Succession Planning Knowledge Management, Leadership Development, Stress Management and Team Building in Labs. All Scientists have indicated that scientists are not trained in Sleep Management in Labs. It can be inferred that the majority of the scientists are presently not trained in all the identified tools & techniques except in Executive Education.

(iv) From the findings at Para 3(E), it is observed that Team Building has been given the maximum importance and Sleep Management has been given the minimum importance.

## **6. Conclusion**

The majority of the scientists have indicated that most of the identified tools & techniques can improve the productivity of knowledge workers and most of the identified tools & techniques except Sleep Management are used in labs or scientists are encouraged to acquire skill in the same. The majority of the scientists are presently not formally trained in all the identified tools & techniques except in Executive Education. Team Building has been given the maximum importance and Sleep Management has been given the minimum importance.

It is also generally observed that the tools & techniques in which less number of Scientists have been trained, usefulness of those tools & techniques have been appreciated by less Scientists, use & encouragement given for those tools & techniques are also less in Labs and Scientists also have given less importance for those tools & techniques.

To improve the productivity of knowledge workers, each organisation should conduct studies to identify the tools & techniques which can improve the productivity of knowledge workers. The identified tools & techniques should be used extensively in a knowledge intensive organisation and all the knowledge workers should be formally trained in these tools & techniques to improve their productivity.

The possible limitation of the study is that the findings are based on the perception of the scientists and there is also difficulty in measure of productivity of knowledge workers. Even though number of studies has been carried out in the past to measure the productivity of knowledge workers, there is presently no universal acceptance for a particular procedure which can be applied to measure the productivity of knowledge worker. Further research is needed to find out the procedure for measuring the productivity of knowledge workers.

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