



ADMINISTERING in an Age of GLOBAL REGULATION

THE GLOBAL financial crisis and its aftermath have brought home to governments worldwide, the realization that they are affected by changes in the global financial, product and services markets to a significantly greater extent than ever before. Governments worldwide have also tried to coordinate their responses to the crisis, through discussions at intergovernmental forums such as the G-20. While the effectiveness of such coordinated intervention is patchy at best, there is one implication of this concerted effort that has an implication for administrative structures in developing countries - the spread of global regulations and standards into domestic regulation.

The process of globalization gathered pace primarily because of two factors - reduced trade and investment barriers worldwide, particularly in developing countries and the rapid growth of technology which made global delivery of services possible. As governments world-wide tried to increase

"The rapid growth of technology, the globalization of production and service delivery, and the lowering of barriers to domestic investment will force governments to harmonize domestic regulations to global standards at a faster pace than before. However, national governments have the responsibility to ensure that the administrative structures are better prepared to cope with the domestic impact of such harmonization. This would ensure that the positive effects of such harmonization outweigh its negatives, and that the harmonization is welfare enhancing."

their international trade and attract greater investment into their domestic markets, they reduced



barriers to trade and investment significantly. While this has ensured greater mobility of capital for investment, it has also, quite naturally, increased the power of investors vis-à-vis governments. Governments became reluctant to retain high barriers to trade and investment for fear that investors will turn away and seek more 'investment friendly' locations elsewhere. They have also seen harmonization of domestic regulation with global regulation as a way of attracting foreign investment into their economies. Governments have sometimes competed with each other to reduce regulation, or harmonize them with other states, leading to a situation where some regulations that are essential in a national context, to protect domestic producer or consumer interests, have been either removed or significantly amended.

Globalization has had other negative effects as well. The impact of pollution and environmental degradation are felt outside national borders, both in the region and sometimes beyond. The rapid spread of newer diseases is facilitated by increased global travel. Such global problems require global solutions and such solutions often imply greater harmonization of policies at a global level.

Harmonization and its Impact

While global regulation is nothing new, the extent of its coverage has significantly broadened in recent years. In areas as diverse as trade, investment, banking, environment, health and intellectual property rights, governments have accepted global

standards that are then applied domestically. Though harmonization has its benefits, it also has its costs. Global standards often constrain domestic firms in their ability to access markets abroad, increase competition in domestic markets and sometimes deprive domestic consumers of access to essential products by increasing

costs. The globalization of regulation thus, imposes additional responsibilities on administrative systems worldwide. For administrators in developing countries, the challenge is two-fold - not only do they need to understand the implications of global regulation in a national context, they also need to develop national administrative mechanisms to cope with some of the welfare-reducing implications of such globalized

"Though harmonization has its benefits, it also has its costs. Global standards often constrain domestic firms in their ability to access markets abroad, increase competition in domestic markets and sometimes deprive domestic consumers of access to essential products by increasing costs."

regulation. The global financial crisis has led to a realization worldwide that, even in a globalized world, domestic policy responses are critical to deal with the aftermath of the failures of globalization.

Harmonization of regulation has been deepening ever since the end of the Cold War. The collapse of the eastern bloc and the subsequent opening up of economies that were until then protected behind high protectionist walls, led to a significant increase in global trade and investment. It also significantly increased the role of multi-lateral organizations which were mandated with task of developing global trade, environmental and financial regulation. The creation of the World Trade Organization in 1995 was a significant milestone in this regard. The erstwhile GATT

agreement that had, until then covered only barriers to trade in manufactured goods, expanded into a global multilateral trade organization that covered trade in services and domestic rules in trade-related areas such as intellectual property rights and investment. The General Agreement on Trade in Services sought to open up services markets worldwide. The Trade Related Aspects of Intellectual Property Rights Agreement (TRIPS) mandated minimum standards of intellectual property rights protection in developing countries. The Trade Related Investment Measures Agreement (TRIMS) required WTO member-states to liberalize their investment regulations and make it easier for foreign firms to invest domestically.

In addition to trade liberalization, there was a greater emphasis on harmonizing labour and environmental policies as well. Though successfully resisted by developing countries, there was a move to introduce minimum environmental standards and labour standards into international trade regulation. In the area of environment, the Kyoto Protocol was a concerted global effort to reduce emissions by adopting targets for reduction of emissions. Though it was not mandatory on them, many developing countries such as India, have set targets of their own with regard to greenhouse gas emissions in line with global efforts. International financial organizations such as the Bank for International Settlements also began to develop rules for capital adequacy and reserve requirements for banks in member states.

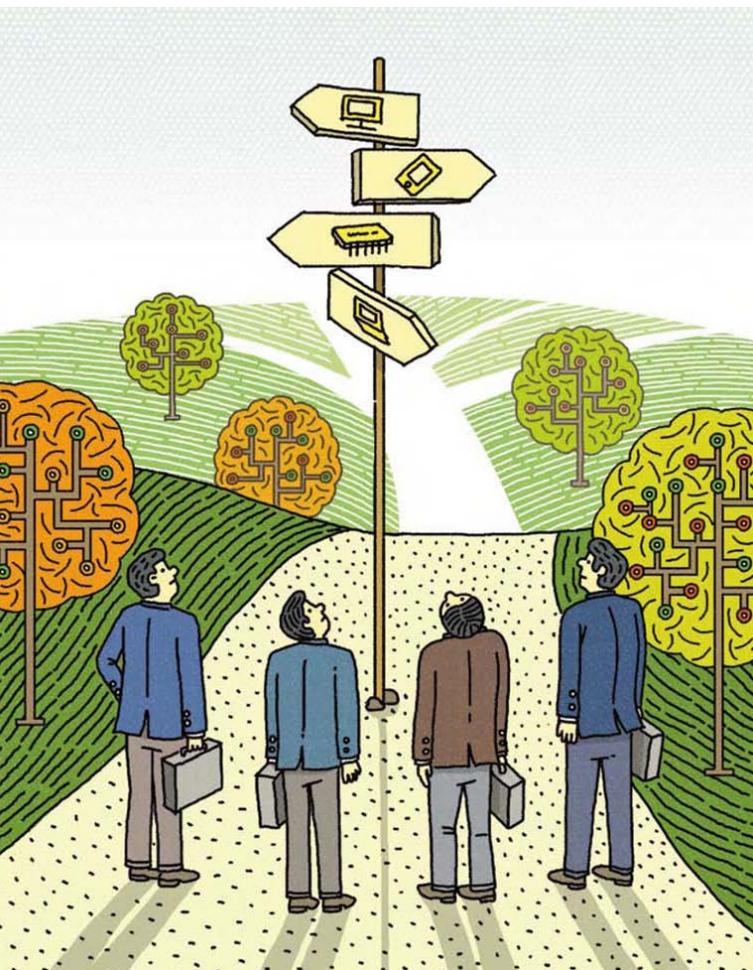
While the increasing harmonization of policy has undoubtedly increased global trade and investment, and ensured that there are coordinated efforts to address global concerns such as the environment, there are deep concerns about both, the process of deciding on

the parameters of harmonization and also the impact of harmonization. The negotiation of global agreements follow a process quite different from that followed when national legislation is formulated. Negotiated by government representatives within international organizations, such agreements very often do not go through the process of debate and scrutiny that domestic legislation passes thorough. In many countries, including India, international agreements negotiated and signed by the government do not have to be approved by national legislatures before coming into effect. This creates concern about the legitimacy of such agreements.

Some international agreements do have a welfare-reducing impact domestically that governments

"In many countries, including India, international agreements negotiated and signed by the government do not have to be approved by national legislatures before coming into effect. This creates concern about the legitimacy of such agreements."





around the world find difficult to deal with. The Trade Related Aspects of Intellectual Property Rights Agreement, for example, has made it much more difficult for firms in developing countries to produce generic version of patented drugs. While the agreement does have provisions that allow countries which are faced with national health emergencies to override patenting regulations, to ensure access to drugs, they often have to negotiate a maze of

"The rapid growth of technology often outpaces the ability of governments to understand the implications of new technologies that are emerging and take countermeasures to ensure that these are regulated in the public interest."

international regulations to ensure that such actions will not lead to retaliatory sanctions by other countries. As more and more countries around the world enter into regional trade agreements, they are often forced to give concessions in the area of environmental standards and labour standards that hurt the interests of domestic industry and workers.

Reforming Administrative Capabilities

The impact of harmonization of global regulation raises the inevitable question of how administrative capabilities in developing countries could be improved to deal with emerging challenges. There are three aspects of administration that could be addressed to ensure that administrative mechanisms are better able to deal with future challenges - capacity building, better knowledge management and improved responsiveness to local concerns.

The rapid growth of technology often outpaces the ability of governments to understand the implications of new technologies that are emerging and take countermeasures to ensure that these are regulated in the public interest. Rapid growth in the bio-sciences creates opportunities for revolutionary cures for diseases, but also raises major ethical concerns. Advances in communication technologies dramatically improves access to information, but also raises concerns about privacy. Developments in energy technology, such as the recent advances in hydraulic fracturing and drilling for shale gas, raise the prospect of alternatives to oil as a primary source of energy for transportation, but gives rise to concerns about its environmental impact. These developments in diverse areas of technology require governments to develop appropriate regulatory responses. These policy responses often have to be coordinated not just at a national level, but even globally. However,



regulation, if it is to be effective, has to keep pace with technology development and it is here that administrative systems need to develop better capabilities. Capacity enhancements for technology planning and forecasting are critical for proactive regulation. An adequate understanding of technology developments and their implications is also critical for those in government who participate in international negotiations where global regulations are framed.

While organizations for forecasting and assessing technology developments do exist, what is missing is sufficient integration with the various departments of governments that deal with technology regulation. Regulation often follows technology with a lag. Greater integration of forecasting and regulation would ensure that regulation keeps pace with technology developments, leading to a more stable regulatory environment for both investors and consumers. This integration does not require major administrative reform or fundamental changes to existing regulatory structures. Better integration could be achieved by joint working groups involving civil servants and technical organizations that attempt to forecast technology developments in specific sectors and also the regulatory implications of these developments. It might involve scientists working in various departments for a specific period of time to help officials formulate more effective regulation. It could also involve officials from various government departments working in technical institutions, either within the country or abroad, to familiarize themselves with technology developments that have an implication for regulation.

Knowledge management is another area that needs greater emphasis. In the past, when the pace of technology development was relatively slower,



administrators could seek the help of subject experts to understand the implication of such technology developments. They could then put in place appropriate policy responses, to ensure that the negative effects of changes are minimized. However, at a time of rapid technological change the timeliness of response to changes in the technology environment is critical. Administrators have to respond fast if the response is to be effective. Rapid response, if it is to be effective, requires adequate information. Knowledge management systems could be an effective way of delivering necessary information into the hands of administrators. Knowledge management systems allow organizations to capture knowledge that exists within the

"Knowledge management systems allow organizations to capture knowledge that exists within the organization, at different levels, on a specific issue and how best to deal with problems that arise in them."

organization, at different levels, on a specific issue and how best to deal with problems that arise in them. Large administrative systems are vast storehouses of tacit knowledge on how problems are to be addressed and resolved. Very often, this knowledge remains with an individual administrator, or at best one government department, without the



information percolating to other levels of government that would find this information useful. Large corporations and even some governments abroad have developed effective knowledge management tools that ensure that organizational knowledge is captured and accessible to those who might find it useful. Administrators could be encouraged to share their knowledge and experience of dealing with specific issues in a codified framework which would then be available for others in the system to access. Knowledge management systems could also provide access to information, or to subject experts who could guide administrators in tackling problems that they face.

While regulation is becoming more standardized and global, the impact of such regulation is often felt locally. The same regulatory framework can have a differential impact on different stakeholders. Hydraulic fracking for shale gas, for example, might raise concerns about its impact on groundwater levels in one region, while in another region the concern might be about ground subsidence. Lowering of trade barriers might affect small and medium scale industry in one region, while it might benefit service-sector

firms in others. Tougher environmental standards might be effective for regions which are heavily industrialized and polluted, but might deter needed industrial investment in an area that is not very polluted since it is not industrialized. The differential impact of regulation means that the same policy framework may not be effective in all situations. Regulations need to be more flexible and administrators need to be given greater freedom to adapt regulations to suit local needs and

concerns. A national policy framework might not suit all states and regions and policies need to reflect this realization and allow for greater flexibility in implementation.

The increasing pace of globalization has posed major challenges for national governments ever since the process began to gather pace in the early nineties. The process will pose even greater challenges in future.

The rapid growth of technology, the globalization of production and service delivery and the lowering of barriers to domestic investment will force governments to harmonize domestic regulations to global standards at a faster pace than before. However, national governments have the responsibility to ensure that their administrative structures are better prepared to cope with the domestic impact of such harmonization. This would ensure that the positive effects of such harmonization outweigh its negatives, and that the harmonization is welfare enhancing.

Source : Yojana 3/2014

Augmenting NPC's role in Industrial Productivity

Enhancing productivity has emerged as a new national priority in India where the efforts of all stakeholders will have to converge to accelerate the process of economic growth. Our business organization will have to improve their performance to ensure their survival and growth in a highly competitive world.

In an interaction with ***Bureaucracy Today***, National Productivity Council Director General Harbhajan Singh talks about how the organization is revamping itself and combining its promotional mission with professional approach to provide world class services to the Government and industry.

- By Soma Chakrabarty



The Change is quite apparent as one enters 'Utpadakta Bhawan' the headquarters of the National Productivity Council (NPC) situated at New Delhi's Lodhi Road. Just two months after the dynamic IAS officer Harbhajan Singh assumed the reins of the organization, the once non-descript office which is undergoing a makeover became a workplace bustling with activity.

"We have to make ourselves relevant" was the first statement the NPC Director General made after he met ***Bureaucracy Today*** in his newly renovated office and shared the initiatives being taken by him to bring the NPC closer to industry.

"NPC is an old organization. It was established in 1958 to enhance industrial productivity by way of consultancy, training, spreading awareness and making things easier for industry. Gradually it started covering other sectors like agriculture. At that time it was unique organization, the only body of its kind but of late, lots other private organizations which are doing similar things as the NPC have come up. In this age of competition when there is mushrooming of knowledge schools, the NPC cannot go the conventional way," the soft-spoken bureaucrat says matter-of-factly.

Sharing his plans to take head-on-the challenge from private players and make the NPC a leading organization, Harbhajan Singh tells ***Bureaucracy Today***, "The NPC cannot sustain if it remains traditional. It cannot continue with the same model. We have to serve industry in such areas where private players are not in competition."

Explaining further, he says, "Private players have various objectives when they venture into an area. They have to make money also it's for business purpose. Though we also have a business purpose but sometimes even if the profit margin is less, we can venture into those areas. For example, we have to provide consultancy to Government organizations where we may not charge consultancy fee or we may charge very reasonable money. We may not make profit but we can increase our visibility."

LEAN MANAGEMENT SCHEME

The 1983-batch IAS Officer of the Uttar Pradesh Cadre, who is known for transforming non-performing institutions into proactive ones, tells ***Bureaucracy Today***, "Right now we are focusing on Lean Management for Productivity Enhancement. This Practice is very profitable for the Micro, Small and Medium Enterprises (MSME) sector which contributes almost 41 per cent of the total GDP. The lean management scheme is all about how to bring best practices in manufacturing activities of industries, how to bring efficiency in their manufacturing processes, how to reduce wastage, how to conserve energy, how to take care of environment and how to provide them the basic manual tools."

Hoping that the lean management scheme will bring the NPC closer to industry, Singh Explains, "In most cases, MSME industries cannot hire consultants on their own due to budget constraint. We are telling them to make a group of six-seven people and make a special purpose group. Get that group registered and the NPC will give them a list of consultants. The MSME firms will have the freedom to pick up any consultant from that list. Then the consultant would

visit these units. First he would take stock of the existing situation, and then he will study the case and tell the firms how they can improve things. It is also very cost effective as the budget for the project would be between only Rs. 30 lakhs and Rs. 35 lakhs for that cluster. Under this scheme, 80 per cent money comes from the government; the rest 20 per cent industry has to give. We will monitor and implement the scheme. The scheme will help industry. Also it would fulfil the Government agenda for the MSME sector. The initiative will also bring the NPC closer to industry and its problems, address its issues and help it in sorting out its problems. This way the NPC would also become relevant. Industry will learn from the NPC and vice-versa. The NPC can help industry and earn revenue also. It will have job, money, contact and relevancy for the people to whom it has to serve."

AIP - ANOTHER AREA OF FOCUS FOR NPC

Another area of focus for the NPC is the Ambedkar Institute of Productivity (AIP) in Chennai. The AIP is the long term training wing of the NPC. "We have a very good set-up in the AIP. My next priority is to see that the AIP infrastructure is utilized to the maximum and industry is being able to make the best use of it. This we are trying to do by introducing more courses. The institute has all the facilities for teaching and is equipped with state-of-the-art laboratories for hands-on experience. The institute has A-class infrastructure, on a par with international standards. It has equipment like boilers and steam system installed. All the equipments are in working condition. The training being imparted in the AIP is different from what is being taught in any other private educational institute," Singh says.

"We also intend to get in Touch with educational institutes. A MoU is in place with the National Institute of Technology, Trichy, Tamil Nadu. Under the agreement, there will be student and faculty exchange programmes, summer internships for BTech and MTech students. The AIP will also organize workshops and seminars," the IAS officer tells ***Bureaucracy Today***.

OTHER INITIATIVES

The NPC Director General says he has initiated measures under which the organization would take up a sector, study the various problems being faced by the sector and come up with recommendations which can help in the growth of the sector. "We have recently done a study on boilers. We have conducted workshops and come up with certain recommendations. We will give it to industry and the Government. Likewise, we are going to take up the issues of decline of the bicycle manufacturing industry in Ludhiana, the leather and textile manufacturing industry in Kanpur and the sports goods industry in Jalandhar. We will analyse why these once booming industries have failed. We will prepare a report and give it to the Government highlighting the potential sectors which are not picking up and the various issues which are acting as a stumbling block. We have 120-odd consultancies. Our job is to study," says Singh who holds a postgraduate degree in History and is also a law graduate.

He says, "Productivity enhancement in the Northeastern region is also on our agenda. The region has lot of scope and great opportunities. It is very important that the region should be covered. In the Northeast we are looking into taking up the bamboo industry".

DG'S VISION

On his vision for the NPC, the Director General, who in his own words is "trying to lift the mood" of the organization, tells Bureaucracy Today, "I want to see the NPC in the national mainstream and become an organization which is relevant to the Government, Industry and the people who are connected with it."

With his dream to take the NPC to the pinnacle of success, the bureaucrat concludes, "If the NPC is there, people should know why it exists. I tell my staff also that you have to become relevant and important so that the industry should look up to you."

Source : Bureaucracy Today, March-2014

Am I willing to give up what I have in order to be what I am not yet? Am I able to follow the spirit of love into the desert? It is a frightening and sacred moment. There is no return. One's life is charged forever. It is the fire that gives us our shape.

- Mary Caroline Richards

PRODUCTIVITY METHODOLOGIES, TOOLS AND TECHNIQUES
MANAGEMENT OF PHYSICAL ASSETS
for
HIGHER CAPITAL PRODUCTIVITY
 - S.K. Chakravorthy

Modern, high-speed, large-scale, continuously running, highly automated, complex plant and machinery require advanced asset management systems. To maximize the productivity of these physical assets, we have to ensure very high asset utilization, along with operational reliability, safety, and security. The deterioration of those costly assets should be minimized by increasing their economic life through appropriate maintenance.

Physical assets deteriorate with age or hours of operation. In the wearout stage, random breakdowns increase and operation gradually becomes uneconomical. A decision must then be made to recondition the asset or procure a new one. The capital cost and degree of wear vary in inverse proportion. The best strategy is to determine the proportionate combination that minimizes their sum. This methodology was developed by the

Machinery & Allied Products Institute of Ohio, USA, and can be used for almost all equipments.

The deterioration of equipment leading to failures and breakdowns is mainly due to "corrosion" and "wear and tear." Surveys showed that 3% to 4% of a country's GDP is lost due to corrosion and about 5% due to the wear and tear of physical assets. Corrosion is destruction of physical assets due to reaction with the environment or destruction of materials by means other than mechanical. Common examples are rusting of steel via uniform attack and galvanic, crevice, pitting, intergranular, erosion, and stress corrosion.

Wear is damage to surfaces caused by loss of material or by plastic deformation due to interactions between surfaces in relative motion. Common examples of wear are bearing failure, gear failure, failure of pistons and crank shafts, etc. Multiple wear mechanisms can occur in an asset,

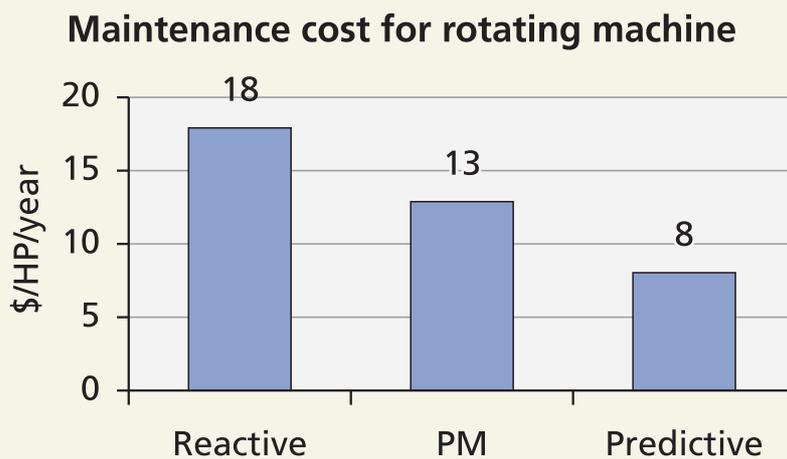


Figure 1. Comparison of maintenance strategy costs per horsepower (HP) for a rotating machine.

like abrasion, adhesion, erosion, cavitation and surface fatigue.

For maximizing returns on net assets and the productivity of physical assets, their availability must be maximized at minimum cost. At the same time, efficiency and effectiveness must be maximized at minimum life cycle cost. This can be achieved by increasing operational reliability and maintainability of the asset and by controlling maintenance and operation costs. Therefore, an optimum maintenance strategy for physical assets is needed to ensure value-added output, product quality, prompt delivery, employee safety and motivation and minimal manufacturing costs. Different maintenance strategies are explained below.

Breakdown maintenance

Breakdown maintenance is a reactive approach. The asset is operated until it fails or breaks down. This approach is uneconomical as it leads to long asset downtimes, frequent failures, poor product quality, long waiting times, high capital expenditure on repair, and reduced safety and morale. The maintenance cost for assets becomes very high. The damage to assets is also heavy, and accidents causing injury and environmental problems may occur. Generally, the average direct cost of maintenance is about 4% of the fixed asset and 28% of manufacturing cost. Some 40-60% of direct maintenance cost is due to spare parts.

Preventive maintenance

Preventive maintenance (PM) is essential for slowing

the deterioration of components and subassemblies of asset. It comprises routine activities like cleaning, lubrication and periodic replacement of failure-prone components so that basic conditions can be maintained, wear and tear kept under control and unplanned forced outages of assets avoided. PM activities should be planned according to the asset failure history and original equipment manufacturer's recommendations. Such activities should be based on production plans so that assets are available for PM without disrupting production. This strategy has some disadvantages. A tendency to overmaintain will incur high costs. Fixed-time component replacements may cause suboptimal utilization, with

the probability of breakdowns remaining. If the mean time between failures is not assessed properly, planned outages for replacing components cause losses in capacity utilization. One study revealed that 40% of PM is unnecessary. This

strategy needs proper documentation such as work orders, assessment and documentation of maintenance time standards, maintenance of asset registers, failure history cards, inspection checklists and maintenance instructions.

Predictive or condition-based maintenance

Maintenance carried out based on actual operating conditions of assets instead of time is called predictive or condition-based maintenance (CBM). Corrective actions are carried out in a planned way to maximize availability and minimize cost. Combining CBM with online in-situ maintenance can achieve zero

Current vs. benchmark maintenance practice

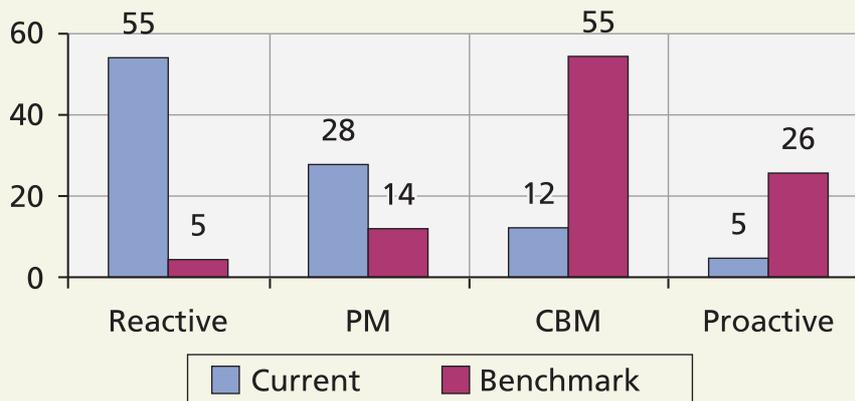


Figure 2. Current versus benchmark maintenance strategies.

breakdowns and zero downtime. Figure 1 shows maintenance costs per horsepower for rotating machines using different strategies. The CBM Strategy can reduce maintenance costs by 50%. CBM can be done offline or online, such as checking the tension in a V-belt drive system while the asset is shut down and vibration monitoring of a machine in operation, respectively. Parameters that can be measured and monitored in a running machine are noise, vibration, shock pulses, temperature, clearance, wear rate, contaminants. etc.

are based on reliability and maintainability requirements. Tools such as failure mode and effect analysis, fault trees and fishbone diagrams are used to determine the root cause of failures and take corrective action. Maintenance prevention features can be built in the asset. Figure 2 shows current versus benchmark maintenance practices and gaps in asset care strategies.

Conclusion

In managing physical assets productively, the optimum maintenance strategy should be selected depending on asset criticality. Criticality can be determined based on the downtime cost, direct cost of maintenance and costs due to quality problems and safety risks. Another criterion is the type of failure, for example, random or wearout. For critical assets, a breakdown maintenance strategy cannot be adopted, whereas for non-critical assets even breakdown maintenance can be more economical

than other strategies. If failures are random and observable, CBM is the best strategy, but if they are random and not observable, proactive maintenance is better. Similarly, if wearout failures are observable, CBM is the best strategy; when not observable, time-based PM is the best choice.

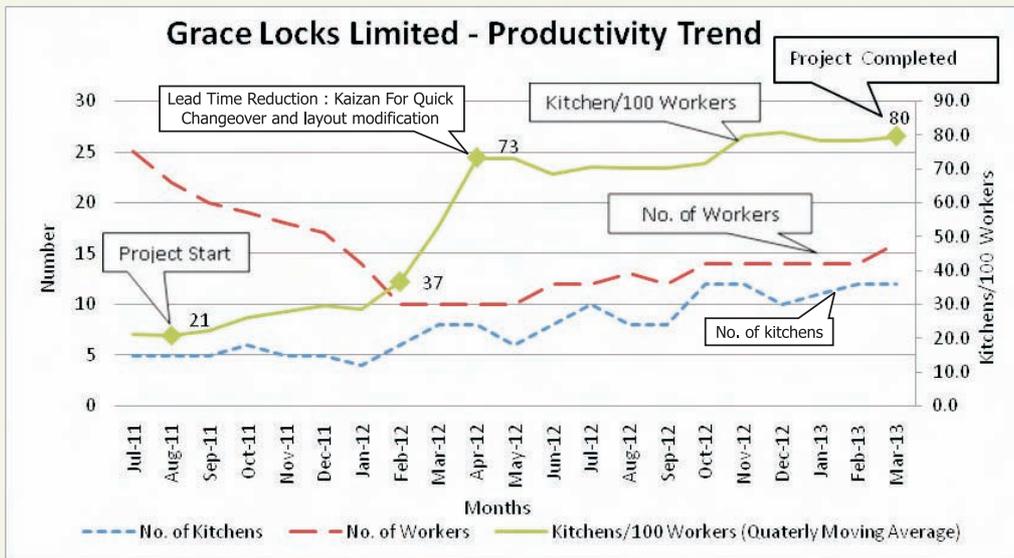


Figure. Timeline of productivity improvement in Grace Locks.

The investment for procuring CBM instruments is about 1-5% of the capital value of the asset being monitored, and the cost-to-benefit ratio is usually 1:5. For example, in a 132/33-kv switch yard of a captive power plant, the operational reliability of the equipment could be increased to 99.99% with zero downtime by thermography (monitoring hot spots on components like transformer bushings, isolator joints, circuit breakers, bus-bars, cable terminations and joints).

Proactive maintenance

In proactive maintenance, the life cycle cost of capital assets is minimized. Equipment design and selection

S.K. Chakravorthy, Dy. Director General, NPC

National Productivity Week-2014

"Lean Management for Productivity Enhancement"



Lean Management System works on the following 5 principles:

1. **Value** - specify what creates value from the customer's perspective.
2. **The value stream** - identify all the steps along the process chain.
3. **Flow** - make the value process flow.
4. **Pull** - make only what is needed by the customer (short term response to the customer's rate of demand.)
5. **Perfection** - strive for perfection by continually attempting to produce exactly what the customer wants.

Productivity Week is observed all over India between 12th to 18th February every year. The purpose is to draw the attention of all concerned, towards the concept and encourage implementation of productivity tools and techniques. This year the theme had been chosen as "Lean Management for Productivity Enhancement for the Productivity Week-2014 (12th to 18th Feb., 2014).

The formation of National Productivity Council is celebrated every year all over the country by commemorating 12th February as **Productivity Day** and the following seven days as **Productivity Week** (12th-18th February).

Lean management is characterized by its drive toward achieving profitability and productivity through continuous improvement and resource waste elimination. It is an organizational culture as well as specific practices with clear goals. Thousands of organization worldwide have achieved tremendous productivity and return on investments by implementing lean practices and techniques.





Lean Management System considers the following 7 types of manufacturing wastes (muda):

1. **Overproduction** - Occurs when production should have stopped.
2. **Waiting time** - periods of inactivity.
3. **Transport** - unnecessary movement of materials.
4. **Extra processing** - rework and reprocessing.
5. **Inventory** - excess inventory not directly required for current orders.
6. **Motion** - extra steps taken by employees due to inefficient layout.
7. **Defective goods** - don't conform to specifications or expectations.

And the following 7 types of service wastes (muda):

1. **Delay** - customers waiting for service.
2. **Duplication** - having to re-enter data, repeat details etc.
3. **Unnecessary movement** - Poor ergonomics in the service encounter.
4. **Unclear communication** -



having to seek clarification, confusion over use of product/service.

5. **Incorrect inventory** - out of stock.
6. **Opportunity lost** - to retain or win customers.
7. **Errors** - in the transaction, lost/damaged goods.

The lean management leads to the following benefits at all levels.

1. **Company** - It ensures less waste which means low expenditure and investment. The reduction of waste will ensure improved product quality profitability and optimized production.
2. **Customers** - It ensures improved customer care services and efficient supply of goods and services to clients.
3. **Employees** - It ensures employees due to the safe working environment that the method avails to them.

Lean Management is applicable to government organizations as well. Around the world, government organizations from local law enforcement to national benefits administration have realized the benefits of lean management. They have realized its benefits and started implementing within their organization to streamline complex processes, offer better services to customers, shrinking wastes, and to realize real improvements.

Lean management helps public sector/organizations streamline processes by addressing the causes of

organization streamline process by addressing the causes of organizational inefficiency, building the management systems and capabilities to sustain new ways of working and engaging managers and staff to make continuous improvement a part of everyone's day-to-day job. Lean management programs generally start with pilots to accelerate organizational learning and quickly build a foundation for organization wide change. Teams diagnose problems in a small area and then design and implement solutions, refining them along the way so they can be scaled up to the larger organization. Within 6 to 18 months, this approach can deliver genuine transformations: typical improvements include better employee engagement and development and 15 to 30 percent rises in personnel productivity; 30 to 50 percent higher quality and service-level adherence; and dramatically faster turnaround times and more customer satisfaction.

Lean management also offers substantial risk-



management benefits. When managers understand more about the real needs of stakeholders and customers and eliminate non-value-added activities, organizations can deploy human and financial resources to the areas where they can make more of difference. With rapid test-and-learn events, managers understand the implications of changes before rolling them out across the organization - and

can make course corrections early and often. Standardizing work increases the predictability of outcomes and captures best practices. Creating a culture of transparency and constructive problems solving encourages staff to identify and mitigate risks and inefficiencies.

The implementation of lean philosophy demands a motivated and trained work-force and committed top management. The organization can make game-changing advance by improving a wide range





of processes, from hiring and procurement to customer services. Focusing on a single process can yield incremental progress, but it often fails short of real and lasting transformation as Lean Management is a continuous improvement process where it focuses on incremental improvement of products, processes, or services over time, with the goal of reducing waste to improve workplace functionally, customer service, or product performance. Therefore, "Lean Management for Productivity Enhancement" has been chosen a theme for the "Productivity Week-2014 (12th to 18th February 2014).

The Director General, NPC had earlier written in the

context to Chief Secretaries, Secretaries, of Govt. of India, Heads of Apex Industry Bodies/Associations, Heads of PSU's and other related and prominent business houses to organize various promotional events during this week. NPC, Hqs. its Regional Professional Management Groups (RPMG's) and the Local Productivity Councils (LPC's) rendered necessary support to the institutions, organisations and departments in organising and conducting these programmes all across the nation. At NPC HQ level, numerous promotional activities such as organisation of Foundation Day Lecture, theme based conferences as well as distribution of specially designed posters, messages card sets on the

Productivity Week theme were carried out. The RMPG's and LPC's also undertook suitable activities apart from facilitating the other organisations and enterprises all over the country. In delivering professional talks as well as organising special events on the subjects for which necessary assistance was extended by NPC across the country. The Productivity Week related programmes organised throughout the country attracted wide publicity through national and regional newspapers as well as in electronic media.



THE INSTITUTIONS & INDUSTRIES WHICH REPORTEDLY CELEBRATED PRODUCTIVITY WEEK WITH GREAT ZEAL AND FANFARE

- Tiruchirapalli Productivity Council
- Madras Cements (P) Ltd.
- Chettinad Cements Corp. Ltd. Puliur
- South Gujarat Productivity Council
- Chalthem Sugar Factory Gujarat
- KRIBHCO, Surat
- Assam Productivity Council
- State Govt. Ind. Development Corp.
- Chamber of Trade & Commerce in Assam
- Industrial Employers organizations, Viz. AIMO, FINER, CII, NECCI, etc.
- Indian Oil Corporation Ltd., Bongaigaon Refinery
- IOC, Digboi Refinery
- Muttuck Tea, Assam
- Madurai Productivity Council
- Kerala State Productivity Council
- Coimbatore Productivity Council
- Andhra Pradesh Productivity Council
- Salem Productivity Council ONICRA, Chennai
- ACC Limited
- Amex Alloys Private Limited
- Anandha Fabrications (CBE) Pvt. Ltd.
- Aqua Sub Engineering
- Banaanaa Slice
- Best Engineers Pumps Pvt. Ltd.
- Bimetal Bearings Limited, Chennai
- CRI Pumps Pvt. Ltd.
- Dimexon Diamonds Limited
- DMW Machinery India (P) Ltd.
- Dr. N.G.P. Arts and Science Collage
- F1 Solutions
- Gangothri Textiles Limited
- Indo Shell Cast Private Limited
- Intergra Automation Pvt. Limited
- KOB Medical Textiles Pvt. Limited
- KU Sodalamuthu & Co. Pvt. Limited
- L.G. Balakrishnan & Bros Limited
- Lakshmi Machine Works Limited
- Mahendra Pumps (P.) Limited
- National Textile Corporation Limited
- Network Clothing Company (P.) Limited
- PSG Industrial Institute
- Rangavale Industries
- RVS Educational Trust
- Sakthi Sugars Limited
- Salzer Electronics Limited
- Silver Crown Metal Coatings
- Sri Karthikeya Spinning & Weaving Mills
- Sree Saraswathi Thyagaraja College
- Treaddirect Limited
- Veejay Lakshmi Engineering Works Limited.
- Venkateswara Steels & Springs (India) Pvt. Ltd.
- Avinashilingam Deemed University for Women
- Craftsman Automation (P.) Ltd.
- CRI Pumps Ltd.
- Dimexon Diamond Ltd.
- Dr. Mahalingam College of Engineering
- Emerald Jewel Industry Ltd.
- GEEDEE WEILER (P) Ltd.
- ITC Ltd (PSPD) Unit: Kovai
- Janatics India (P.) Ltd.
- Kumaraguru College of Technology
- Lakshmi Machine Works Ltd.
- Lakshmi Ring Travellers Ltd.

THE INSTITUTIONS & INDUSTRIES WHICH REPORTEDLY CELEBRATED PRODUCTIVITY WEEK WITH GREAT ZEAL AND FANFARE

- Larsen & Toubro Ltd.
- M.N. AUTO (P.) Ltd.
- Maxwell Industries Ltd.
- PSGR Krishnammal College for women
- Raja Magnetics Ltd.
- Roots Industries India Ltd.
- Treads Direct Ltd.
- Trident Pneumatics Pvt. Ltd.
- India Government Mint (W.B.)
- M/s. AB Mauri India Pvt. Ltd.
- Damodar Valley Corporation (Koderma Thermal Power Station)
- Linde India Ltd. (W.B.)
- M/s. Transafe Services Limited
- M/s. Sawalka Kel Private Limited
- JUSCO (W.B.)
- M/s. Adani Wilmar Ltd.
- M/s. Aditya Birla Insulators, (W.B.)
- M/s. Sonar Bangla Cement
- M/s. Solyvent Flakt (India) Pvt. Ltd.
- M/s. SHV Energy Pvt. Ltd.
- Allahabad Bank (W.B.)
- Castrol India Limited
- East India Pharmaceutical Works Limited
- Dream Bake Pvt. Ltd.
- National Insurance Company Limited (W.B.)
- Damodar Valley Corpn. (CTPS)
- Rail Tel. Corpn. of India Ltd. (W.B.)
- KRIBMCO Corporate office, Delhi
- IPGCL, Delhi
- BHEL, Delhi
- Poona Div. Productivity Concil, Poona
- UV Ayargen Pharma (P.) Ltd., Satara
- Endurance Tech. Ltd., Pune
- Parsuti Ind. Associate & Electronic Co-opt. Estate Ltd.
- Bihar State Productivity Council, Patna
- Odisha State Productivity Council, Bhubaneswar (Orissa)
- Institute of Quality & Environment Management Services (P.) Ltd.
- Utkal Chamber of Commerce & Ind. Ltd.
- East Coast Railway, Maneswar
- Narbheram Power & Steel Ltd., Orissa
- State Productivity Council, West Bengal
- Indian Oil Corporation Ltd., Haldia
- M/s. Chilthan Sugar Factory, Chalthan
- Rajasthan State Productivity Council, Jaipur
- J.K. Lakshmi Pat University, Jaipur
- P.S.G. Institute of Management, Chennai
- Central Institute of Hand Tool, Jalandhar
- H.M.T., Pinjore
- I.I.M., Kozhikode
- Ashapura Minechem Ltd., Trivandrum
- Indian Rare Earths Ltd., Udyogamandal
- Indian Rare Earths Ltd., Kollam
- Karan Group of Companies, Alappuzha
- Malabar Spinning & Weaving Mills, Calicut
- V Guard Industries Ltd., Coimbatore
- V Guard Industries Ltd., Cochin
- Travancore Cochin Chemicals Ltd, Udyogamandal
- Alleppey Co-operative Spinning Mills., Alappuzha
- Kerala Agro Machinery Corporation Ltd., Athani, Aluva
- Hill Lifecare Ltd., Peroorkada Factory, Thiruvananthapuram

THE INSTITUTIONS & INDUSTRIES WHICH REPORTEDLY CELEBRATED PRODUCTIVITY WEEK WITH GREAT ZEAL AND FANFARE

- Hill Lifecare Ltd., Akkulam, Thiruvananthapuram
- Malankara Plantations, Thodupuzha
- Hindalco Industries Ltd., Kalamassery
- Abad Fisheries Ltd., Kochi
- Hindustan Organic Chemicals Ltd. Ambalamugal
- EICL, Veli, Thiruvananthapuram
- FACT Ltd., Udyogamandal
- Hindustan Insecticides Ltd., Udyogamandal
- BPCL-Kochi Refineries Ltd., Ambalamugal
- Kottayam Textiless, Kottayam
- Treadsdirect Ltd, Palakkad
- Autokast Ltd., Cherthala, Alappuzh
- Binani Zinc, Binanipuram
- Rehabilitation Platations Ltd., Kollam
- Malabar Regional Cooperative Milk Producers Union Ltd. Palakkad
- Transformer and Electricals Kerala Ltd., Angamally
- Hindustan Newsprint Ltd., Kottayam
- Cochin Shipyard Ltd., Cochin
- HMT Machine Tools Ltd., Kalamassery
- AVT Natural Products Ltd., Aluva
- Precot Meridian Ltd., A-Unit, Palakkad
- The Travancore Cements Ltd., Kotyam
- EICL Ltd, Melthonnakkal, Thiruvananthapuram
- Tata Global Beverages Ltd., Tetley Division, Munnar
- CII Guardian International Ltd., Kochi
- NTPC Ltd., Kayamkulam, Alppuzha
- M/s. Solyvent Flakt (I) Pvt. Ltd. Kolkata
- International Combustion (I) Ltd. Kolkata
- Videocon Infinity Infra. (P) Ltd.
- KAIL Ltd.
- Tractors India Ltd.
- TVS Motors
- Indian Instt. of Technology
- ZETADEL Technologies (P) Ltd.
- HMT (International), Bangalore
- Instrumentation Ltd. (Raj.)
- Balasore Chamber of Ind. & Commerce, Balasore
- College of Agriculture Engg. & Technology, Ouat
- Neelachal Refractories Ltd. Dhenkanel
- Kanpur Productivity Council, Kanpur
- India Thermit Corporation, Fazal
- M/s Kansai Nerolac Paints, Kanpur.
- M/s Annakut Biscuit Co. Kanpur
- HAL, Bangalore
- Central Warehousing Corpn., Bangalore
- Karnataka Antibiotics, Pharmaceuticals Ltd. Bangalore
- Airpot Authority of India, Guwahati.
- IOCL, Guwahati.
- Rajasthan State Productivity Council., Raj.
- Vishvakarma Industries Association, Jaipur.
- Hindustan Machine Tools, Ajmer.
- Rajasthan Drugs & Pharmaceuticals Ltd., Jaipur.
- Delhi Productivity Council, New Delhi
- Kutch- Saurashtra Productivity Council, Rajkot
- IOC, Mathura
- Baroda Moulds & Dies
- Tata Chemicals Ltd, Ahmedabad
- Aditya Birla Nuvo Ltd.
- Wind World (I) Ltd. Jamnagar
- Echjay Industries (P) Ltd., Rajkot.
- Rajkot District Milk Producer Union Ltd., Rajkot
- Indian Rayon.

NATIONAL PRODUCTIVITY WEEK-2014

"Some Glimpses"



"Some Glimpses"



"Some Glimpses"



"Some Glimpses"



"Some Glimpses"



Lean Management for Productivity Enhancement Greening the Organisation

National Productivity Council (NPC) celebrates its Foundation Day on 12th Feb. every year and the following week (12-18th Feb) as National Productivity Week. As a part of celebrations eminent scholars are invited to share their experience on the selected theme for the year. Series of the Seminars/workshops are organised throughout the country not only by NPC Hqs., its Regional offices but also by Local Productivity Councils in their respective regions and several industries in their premises spread across the country.

The theme for this year Productivity Week celebrations was "Lean Management for Productivity Enhancement". Environment Division had organized one day Workshop on the theme of **"Lean Management for Productivity Enhancement and Greening the Organization" on 18th of Feb. at NPC Conference Hall.**

The **Conference** was inaugurated by Shri Susheel Kumar, IAS, Additional Secretary, Ministry of Environment and Forests and Chairman Central Pollution Control Board (CPCB). Shri Harbhajan Singh, IAS, Director General, NPC while welcoming the Chief Guest emphasized that there have been much changes in development arena since industrial revolution and that environment and climate change



are the important areas of concern today. He also told that Lean Management was very important in this context and this is applied to industries, service sectors as well as agriculture. He reminded the audience that India being amongst the oldest civilizations have very good traditions as far as the environment management is concerned. Shri Susheel Kumar emphasized that though industries do not like regulators but it is important that development is carried out in responsible manner to take care of environmental issues which will be beneficial for the industry in long run. It also urged industries to utilize the funds set out of corporate social responsibility judiciously in the area of health, water conservation

etc. Shri Susheel Kumar reminded the audience that India should not fall in the trap of developed countries to participate in the corrective measures to be taken for the indisciplined industrialization of the developed countries. He felt that even a smallest country would not like to be wasteful in their industrial operations so is the case with India.

In Technical Sessions Shri Ganesh Tripathi, Chief Sustainability Officer from Jubilant Life Science Limited shared the experience of his company titled "Lean and Green-two sides of on coin". He Informed the audience that the Jubilant has included the sustainability aspects in every decision to be taken for their operations. He told that jubilant is very serious about resource conservation and brought down the effluent discharge from 100 meter cube per day to 40 meter cube per day.

Prof. K.R. Chari an Eminent scholar and professional earlier with NPC, shared his practical experiments of utilization of wastes from rice husk boiler, where in the silica from the fly ash of the very high purity is possible to produce which has number of applications.



He also shared another case study where it was possible to make tiles from stone wastes from the stone mining activities.

Mr. M.J. Pervez, Director Environment, NPC deliberated on various aspects of the waste minimizations. He emphasized that Indian industries have to be lean and competitive to meet the challenge of competitions from countries like China. A lively session question and answers was held in the end. The conference concluded with thanks to and from chair.

**"Wining doesn't always mean being first,
wining means you are doing better than
you've done before..."**

- Bonnie Blair

GREENING on the Go

How to Use

Greening on the Go was conceived back in 2000 as a practical way to get the tools, concepts and techniques used in Green Productivity (GP) onto the shop floor and into the hands of small business.

Each concept, tool or technique is explained by answering six questions, which are :

- What is it? Defines the concept, tool or technique.
- Why is it useful? Outlines its attributes.
- How will it help you? Aids in understanding the value of your GP effort.
- Where do you apply it? Shows its placement either within a location or site, or within your business system.
- When is it useful? Delineates either a time reference or a stage where it has particular benefit in your process to adopt GP.
- Who benefits? Characterizes the primary beneficiary of your GP efforts, as well as indicates to whom additional benefit may flow.

To demonstrate the synergy between the various concepts, tools and techniques, references are included with the page number identified in parentheses. Our hope is to minimize your time to source answers as you proceed with *Greening on the Go*.

Most sections also provide a TIP. These are words of wisdom to focus on some feature, or what experience has shown to be an action or situation to avoid. Learning from the mistakes of others is so much more efficient, and less frustrating.

Each section ends with a Ponder Point - User Notes where an idea, an example or a challenge is outlined to prompt you to try something new.

The explanations provided are not intended to be

exhaustive descriptions, with great detail and examples. Rather the style of the explanations is an aid to help you, literally when you are on the go, to solve a problem. Greater explanation of these tools is available on-line or in other reference books that provide more rigorous descriptions.

We hope that you find Greening on the Go a practical aid to achieve Green Productivity.

Activity Network Diagram

What is the Activity Network Diagram?

The Activity Network Diagram (AND) is a graphic representation of the tasks needed to be achieved in order to obtain a goal following the most efficient pathway. Such goals may include the termination of a project, implementation of a training programme or developing GP options.

Developing an Activity Network Diagram is basically done by :

- a) Listing the required activities chronologically,
- b) Determining which activities you need to complete



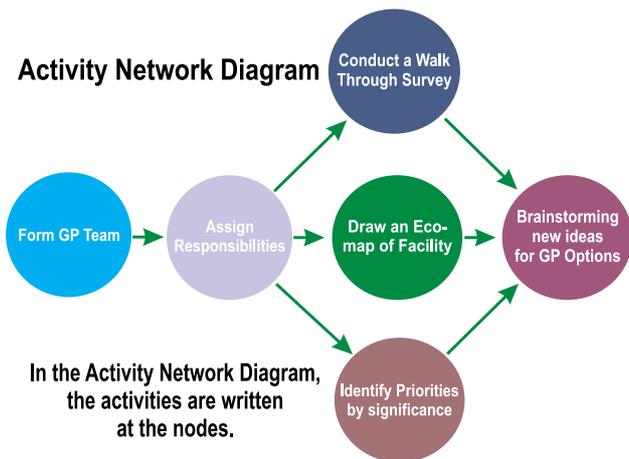


before others can start or finish, and those which can be done in parallel.

c) Graphically displaying your activities (normally using ovals) that are called nodes, and

d) Connecting activities that follow a sequence with activity networks.

Why is the Activity Network Diagram useful?



The Activity Network Diagram is useful in two main ways. First, it allows you to understand and visualize what activities need to be carried out and when. Second, it provides an excellent communication tool for other members of the project or programme. Each GP Team member can see and understand the importance of their role in the overall project.

How will the Activity Network Diagram help you?

The Activity Network Diagram will help you work out the most efficient sequence of events needed to complete any project. It will provide you with a good overview through a graphic representation of the

activities needed to accomplish your GP programme. This is a very good way of developing realistic time frames to meet your deadlines. It can help identify resources that can be reassigned, if necessary.

TIP After the Activity Network Diagram has been completed, you can use the Critical Path Method (CPM) by tracing all those activities which, if delayed, would directly delay the whole project or programme. This way you can identify and easily share those activities that are critical to meeting the project's deadlines, and activities in which there is more flexibility.

Where do you apply the Activity Network Diagram?

It can be used as part of Brainstorming to start a GP programme or to check progress. A variation of an AND is a Gantt Chart that helps you to schedule tasks and task duration.

When is the Activity Network Diagram useful?

The Activity Network Diagram is useful when you want to have more control of the activities that are involved in your task. The AND will come in handy any time you undertake a new project. It is particularly useful when you have multiple activities involved in your GP program.

Who benefits from the Activity Network Diagram?

The project manager, and all those involved in the project, directly or indirectly, will benefit. It empowers each member of your GP Team by showing them their role and the implications of their activities for the project, and the schedule.

Activities, Products and Services

What are Activities, Products and Services?

These are the actions your organization undertakes, the goods that it makes for the marketplace or the contractual support it offers to customers.

TIP Defining these elements of your organization can help provide you with a better understanding of the ways and means you can affect improvement to meet your overall GP goals.

Why are Activities, Product or Services useful?

Activities, Products and Services are the means by which you can start to better understand the Scope (71-1) of your organization and self-diagnose your organization's environmental and productivity health.

TIP These three terms are used in ISO 14001.

How will Activities, Products or Services help you?

A clear articulation of the Activities, Products or Services that your organization has or does is key to understanding what it is that you have or do that causes environmental impact and reduces your productivity. It helps you to understand how the environment if left unmanaged can pose a risk to your business.

Where do you apply the Activities, Products or Services concept?

The concept of Activities, Products or Services should be considered where you wish to understand everything that your organization, or a part of it, does. Changes made to your Activities, Products or Services should be noted because of the effects on your management system and environmental impacts.

When is the concept of Activities, Product or Services useful?

This concept will come in very handy for motivating Brainstorming about what your organization does, determining the Scope of application of your other GP programmes, as well as forming the basic block for developing Checklists and Check Sheets.

Who benefits from the Activities, Products or

ACTIVITY, PRODUCT or SERVICE	ASPECT	ACTUAL and POTENTIAL IMPACTS
ACTIVITY: Rice Cultivation		
In field operations during growth stage/phase	Consumption of water.	Land flooding.
	Use of pesticides.	Pollution of soil Bioaccumulation of toxic substances in fauna resulting in chronic adverse health effects or species loss.
	Emission of methane (i.e. greenhouse gas)	Global warming and climate change.
PRODUCT: Air Conditioner Service, Maintenance and Repair		
Consumer operation of unit	Use of electricity ^c .	Depletion of non-renewable resources.
	Generation of solid waste ^c .	Land use.
	Recovery and reuse of components.	Conservation of natural resources.
SERVICE: Transportation and Distribution of Good and Products		
Fleet operation	Consumption of fuel.	Depletion of non-renewable fossil fuels
	Emission of oxides of nitrogen (NO _x).	Pollution of air - ozone. production - smog.
	Generation of noise.	Discomfort or inconvenience to local community.
Routine fleet maintenance (including iol changes)	Emission of oxides of nitrogen (NO _x).	Achievement of air quality objectives ^d .
	Generation of waste oil.	Pollution of soil.
a Abnormal conditions b Emergency conditions c Organization may be able to influence aspect but may not have direct control d Beneficial Impact		

Source: ISO 14004: 2004 with minor adaptations

Service concept?

This concept allows your GP Team to identify the relationship between quality, productivity, environmental, health or safety issues in a complete way. It fosters systematic thinking - from cradle to grave, or better cradle to cradle. It can benefit those outside your organization's borders because it helps the organization begin to understand the cause and effect of their operations.

Cradle to cradle is a recent evolution in how experts are suggesting businesses look at managing materials with a focus on design.

Source : APO Green Productivity

Lean Manufacturing for Productivity Enhancement

(An Awareness, Knowledge & Networking Event)

(Ahmedabad, 29th - 30th January, 2014)

National Productivity Council, RPMG Gandhinagar organized a two day programme on "Lean Manufacturing for Productivity Enhancement" on 29th & 30th of January, 2014 at Hotel Metropole, Ahmedabad.

The Programme was very well received and was attended by more than 200 participants. The participants were a healthy mix of MSME unit owners, Managers / Engineers in large scale industries, academicians, Lean Management Consultants, Government officials and media representatives.

The Inaugural address for the programme was delivered by **Shri Harbhajan Singh, IAS, DG, National Productivity Council (NPC)**. In his inaugural address, he stressed upon the importance of MSME sector for the national economy. He further stressed the utmost need for productivity improvement in the sector and the steps that the Government at Central level is taking to improve the competitiveness of the sector.

He informed the audience that he has recently taken over as Director General of National Productivity Council. He would focus timely execution of projects with high quality of delivery of service for all stakeholders. He also informed that he is reviewing preparedness of all NPC offices throughout the country for boosting the productivity mission in the country.

He further focused his address on pilot phase of Lean



Management Competitiveness Scheme of Ministry of Micro, Small & Medium Enterprises. He was of the view that the implementation during the pilot phase was slow and assured the audience that the same would be fast during the new up-scaled version of the scheme.

He further assured the gathering that NPC would take Lean Manufacturing on a big scale in the country.

Special address for the inaugural ceremony was delivered by Shri Jaimin

R Vasa, Chairman of MSME Committee in Gujarat Chamber of Commerce and Industry. Himself being an entrepreneur, he explained briefly all the tools and techniques that are collectively called as lean and enlightened the audience about recurring benefits of each.

The key note address on the Theme was provided by professor at Indian Institute of Management, Ahmedabad, Dr. N. Ravichandran.

He started off his address with elaborating on the importance of Manufacturing Sector in the country's economy. He stressed on the fact that most of the small articles such as *diyas*, *tukkals* etc. which are used for Indian festivities are being imported from neighbouring country. This influx of items at a cheaper rate has led to closure of many MSME sectors. Therefore, he opined that, any tools and techniques, which make our MSME sector more and more competitive, should be welcomed with open arms.

The next point that he made was regarding the young population of the country. With less and less manual activities in agriculture, lot of rural youth has to be meaningfully employed in other sectors of the economy. This he opined, can best be done by manufacturing sector. He further stated that for a vast country like ours' a robust manufacturing sector is of paramount importance.

Thereafter, Shri Arvind Patwari, Director, Micro, Small & Medium Enterprises - Development Institute, Ahmedabad talked about development of National Manufacturing Policy and various schemes that Ministry of MSME has brought out under National Manufacturing Competitiveness Council. He dealt in detail regarding how MSME can take benefits from these schemes and programmes.

Further, he lauded the efforts undertaken during pilot



phase of LMCS by individual MSME units, Lean Management consultants and NPC officials. He opined that with successful implementation of pilot phase, the initial breaking of ice phase is over and many clusters are ready to participate in the upscaled version of the scheme.



National Productivity Council

INVITING EXPRESSION OF INTEREST (EOI) FROM LEAN MANUFACTURING CONSULTANTS (LMCS)

National Productivity Council (NPC) has been appointed by the Ministry of Micro, Small & Medium Enterprises (MoMSME), Government of India as “National Monitoring & Implementing Unit (NMIU)” for the implementation and monitoring of 'Lean Manufacturing Competitiveness Scheme (LMCS) - Up-scaled : Revised 2013' to be implemented in 500 manufacturing clusters in India.

Interested Consultants (Individuals/Organizations) working in the area of Lean Manufacturing may apply to us for empanelment.

For details contact **011-24607364, 24607369**

or visit **www.npcindia.gov.in**.



ADOPTION OF LEAN MANUFACTURING PRACTICES:

AN INDIAN CASE STUDY

Realizing the tremendous contribution of micro-enterprises and SMEs (MSMEs) to industrial production, employment generation, and exports, the Government of India, Ministry of MSMEs proposed a Lean Manufacturing Competitiveness Scheme (LMCS) under the National Manufacturing Competitiveness Programme (NMCP). Under the scheme, MSMEs are being assisted in reducing their manufacturing costs through proper personnel management, better space utilization, scientific inventory management, improved process flows, and reduced engineering time and so on. The scheme is basically a business initiative to reduce waste in manufacturing in MSMEs and thus enhance their competitiveness. During the pilot phase, 100 mini clusters were formed to implement this scheme.

A detailed study report was prepared for each participating unit to identify the various projects to be taken undertaken and establish a baseline. The following five projects were identified to address manufacturing waste in the participating units.

1) 5S and culture building to prepare for lean interventions, create a culture for identifying

waste, and responding to those with a positive attitude.

- 2) Manufacturing system building to strengthen the basic manufacturing system and initiate a culture of fact-based decision making. Designing formats for collecting data on daily management activities (production reports, quality reports, delivery reports, etc.) and standardizing critical operations were carried out under this project.
- 3) Institutionalizing kaizen, small group activities and shopfloor meetings to bring the problems to the surface and enable employees to make small improvements. Employees were trained in conducting brainstorming sessions and holding shopfloor meetings to discuss failures and abnormalities. Kaizen were performed in the areas of quick changeovers, mistake proofing, and low-cost automation for reducing quality issues and manufacturing lead times.
- 4) Reducing manufacturing lead time by eliminating zigzag flows and backtracking and improve delivery compliance.

5) Improving material handling systems to supplement the initiatives to be taken under project 4) so that after making the flow linear, the velocity of material movement can be increased to achieve the overall goal of reducing manufacturing lead times.

CASE STUDY

This case study was conducted in Grace Locks Limited, a family-owned producer of modular kitchens within the MIA Beta Light Engineering and Allied Cluster. The business head is Rajen Mohan Varma, and the change leader for the project was Reuben Varma. The Grace Locks project ran from August 2011 to March 2013.

When the assignment started, the company was maintaining large inventories. It was under pressure from customers to shorten lead times and was reeling under a cash-capital crunch. The major areas of concern identified that led to manufacturing waste

and increased lead times are listed in Table 1. The areas of concern were grouped based on their correlation with the five projects. The key initiatives taken under each project are also shown in Table 1.

The key practices initiated were creating a billing format for materials purchased, standardizing the kitchen installation and servicing processes, devising checklists for inspection, and introducing low-cost automation in bottlenecks. In terms of upgrading human resources, the concept of multiskilling was introduced and periodic audits and reviews are now conducted including 5S audits, work standard audits, worker performance reviews, and after-sales service reviews of kitchens installed. Table 2 shows the tangible results of the LMCs project within Grace Locks.

The initial success was achieved through 5S activities, training, SoPs, and establishing procedures for purchasing, storage, and production planning. Breakthrough improvement in reducing lead time was achieved through kaizen for quick changeovers,

Table 1. Major areas of concern, correlation with the five projects, and initiatives to overcome them.

Area of concern and effects	Project	Key initiatives
Random storage practices, resulting in accumulation of unnecessary items and long tool search times	5S and culture building	5S training, 5S zones, shadow boards, visual control, 5S audits
Miscommunication of work orders, lack of written work instructions, untrained workers, resulting in overstock of raw materials and insufficient stock of critical components	Manufacturing system building	Redesign of work orders, setting SoPs, training, developing purchasing process, setting limits on work in progress, multiskilling
Frequent rework in carpentry, resulting in long set-up times in frame making, dust in paint shop, compressor breakdowns, and rework at customer sites	Institutionalizing kaizen, small group activities, and shopfloor meetings	Redesign jigs/fixtures, change to modern wood-cutting tools and welding equipment, low-cost automation for frame making, set maintenance schedule, determine spare parts inventory, redesign to simplify manufacturing and assembly
Zigzag material movement, resulting in poor space and manpower utilization	Improving layout and material handling system	Adopt cellular manufacturing and use trolleys

design simplifications, layout modification, and improved material handling. Further capacity enhancement measures were taken through the adoption of low-cost automation where appropriate. The trajectory of productivity improvement is depicted in the Figure.

There were also a number of intangible improvements that have contributed to higher productivity within the company. For example, the workers are motivated to continue the improvements and absenteeism has dropped. Production planning is easier with the new systems in place. Perhaps most important for customers, the potential for customization of Grace Locks modular kitchens has increased significantly, pointing to further growth of this SME in the future.

Table 2. Tangible improvements after the LMC project in Grace Locks.

Item	Unit of measurement	Before (Aug 2011)	After (Mar 2013)	% Change
Space	m ²	1300	650	50% ↓
Total inventory (raw material + work in progress)	Days	134	20	85% ↓
Manufacturing lead time	Days	30	12	60% ↓
Manpower deployment	Number	22	16	27% ↓
Production capacity	kitchens per month	5	12	140% ↑
Productivity index	Kitchen/100 workers (quarterly moving average)	21	80	280% ↑
Savings (per annum)	US\$ thousand	–	74	

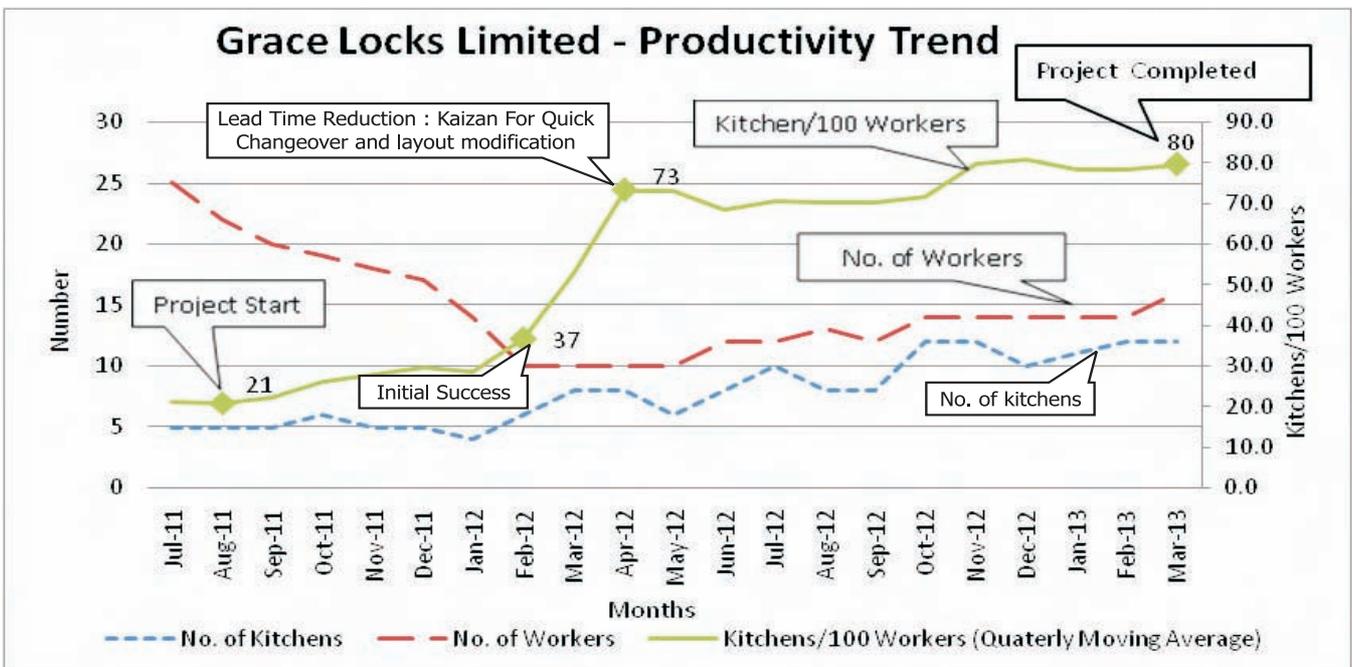


Figure. Timeline of productivity improvement in Grace Locks.



Solar *Rooftop* Initiatives

Meera Bhalla

Solar rooftop systems can be an effective solution for addressing the growing energy demand-supply gap and distribution losses in both urban and rural areas. Given the substantial decline in solar photovoltaic (PV) power generation costs and the increasing conventional energy tariffs, many states are taking an interest in promoting solar rooftop installations. States like Gujarat, Karnataka,

Kerala, Odisha, Rajasthan, Tamil Nadu and Uttarakhand have either devised a policy and regulatory framework for promoting this segment or are in the process of doing so.

Different states are adopting various approaches for the promotion of the solar rooftop segment. While some like Gujarat and Odisha have adopted the



public-private partnership (PPP) model, others like Tamil Nadu are offering generation based incentives (GBIs) to encourage industrial and residential power consumers to install these systems. Meanwhile, a few states like Kerala are focusing only on off-grid rooftop installations till the time they are able to implement an effective metering strategy.

Most states are currently in the process of finalising their respective policies for net metering, which is crucial for the success of grid-connected solar rooftop projects. These meters would help utilities track generation and incentives consumers (households and commercial establishments) through preferential tariffs for generating power from their rooftop installations. States are adopting gross metering and net metering schemes for tracking solar power generation. In a gross metering arrangement, consumers are compensated for the entire power fed into the grid while under net metering, only excess or surplus power generated by consumers is sold to the local utility.

Net metering guidelines have been issued by four states - Andhra Pradesh, Tamil Nadu, West Bengal and Uttarakhand. Meanwhile, gross metering facilities are being set up by rooftop power developers in Karnataka and Gujarat. And Gujarat, Delhi, Maharashtra and Punjab are likely to announce their net metering guidelines in 2014.

A look at the key initiatives taken by select states to harness their solar rooftop potential...

Gujarat

Gujarat is the leader amongst states with respect to

solar rooftop installations. Launched in 2012, the state's 5 MW Gandhinagar Photovoltaic Rooftop Programme is the country's first MW-scale rooftop initiative. The programme is being implemented on a PPP basis by Azure Power and SunEdison. In the absence of a state-level net metering policy, a revenue sharing model has been adopted. Under this, households are offered a financial incentive of Rs. 3 per kWh of electricity generated by the solar rooftop PV system installed on their property. As of December 2013, the total installed capacity under the programme stood at 3.2 MW.

In September 2013, the state government announced its plans to develop 5 MW of solar rooftop projects in five cities Mehsana, Surat, Rajkot,



Bhavnagar and Vadodara. The Gujarat government plans to install 60 MW of solar capacity on household rooftops over the next three years. It also intends to introduce a net metering policy by end-February 2014.

Kerala

Kerala is the only state in India to promote the use of solar energy mainly through rooftop applications. In February 2013, the state launched the 10,000 Rooftop Solar Power Plan Programme. The pilot project is being implemented by the Agency for Non-Conventional Energy and Rural Technology (ANERT) and aims to install 1 kW solar off-grid systems at 10,000 households by December 2014. Under the programme, a maximum subsidy of Rs. 92262 is offered for every 1kW rooftop project. The subsidy will be disbursed only after the completion of



the project. Of the total subsidy amount, Rs. 53,262/- or 58 per cent is contributed by the Ministry of New and Renewable Energy (MNRE) while the remaining is provided by the state government. In all, 22 companies have been selected to install rooftop systems on behalf of the beneficiaries. As of January 12, 2014, around 6,600 solar rooftop systems were installed in Kerala under the programme. However, only 1,000 beneficiaries have received the subsidy so far.

In February 2013, the state government also announced the Kerala Solar Policy, which came into effect in April 2013. The policy focuses on the installation of solar rooftop and off-grid solar projects, and promotion of solar thermal collectors. It aims at adding 500 MW of solar capacity by 2013 and 1,500 MW by 2030. The Kerala State Electricity Regulatory



Commission will be responsible for announcing feed-in tariffs and net metering guidelines for grid-connected solar rooftop projects.

Tamil Nadu

The state government is promoting solar rooftop project under the Tamil Nadu Solar Energy Policy, 2012. The policy envisages setting up 3,000 MW of solar capacity by 2015, of which 350 MW would be grid-connected rooftop projects. The projects are to be developed in three phases - 100 MW in 2013, 125 MW in 2014 and 125 MW in 2015.

Of the 350 MW of solar rooftop capacity, 50 MW is targeted to be achieved from domestic customers, for which the state government is offering a GBI of Rs. 2 per kWh for the first two years, Re 1 per kWh for the next two years and Re 0.50 per kWh for the subsequent two years. The remaining 300 MW will be installed on government buildings and under government schemes for rural and urban lighting. This is the first policy that provides GBI for solar rooftop projects. GBI is an attractive option for households as it reduces the payback period of the project.

In November 2013, the state government also launched the Chief Minister's Solar Rooftop Capital Incentive Scheme. The scheme offers a subsidy of Rs. 20,000 for a 1 kW grid-connected batteryless

solar project, in addition to the Rs 30,000 per kW subsidy provided by the MNRE. The Tamil Nadu Energy Development Agency (TEDA) has invited bids for the supply, installation and commissioning of solar rooftop systems under the scheme, which includes a domestic content requirement clause for the entire capacity allocation.

In the same month, the state government announced its net metering and low tension connectivity guidelines for both GBI- and capital subsidy based projects. The tariff for residential consumers under the highest slabs of consumption is Rs. 5.75 per kWh. However, the net metering policy leaves out industrial and commercial consumers, which have a solar purchase obligation under the state solar policy. Not all industries operate throughout the year and the net metering scheme could have been an attractive option for such high power consumers as they could export the excess energy to the grid.

Andhra Pradesh

The state government is encouraging the setting up of solar rooftop projects through the Andhra Pradesh State Solar Policy, 2012. The policy promotes solar power projects for captive use and sale to third parties as well as discoms under the renewable energy certificate (REC) mechanism and the open access regime. Rooftop and off-grid plants are eligible for RECs under the policy's deemed injection clause. To avail of these incentives, developers have to commission their projects by June 2014. Following this, they would be eligible for the incentives for seven years from the date of project commissioning.

The state government announced its net metering guidelines for grid-connected solar rooftop and small PV projects in June 2013. As per the guidelines, the government will provide 20 per cent subsidy on the total cost of setting up grid connected as well as off-grid solar rooftop projects, in addition to the 30 per cent subsidy offered by the MNRE. For the excess

energy fed by consumers into the grid, the state discom will pay a fixed tariff Rs. 3.50 kWh.

Earlier, the net metering facility was available only to consumers with a three-phase connection. However, in November 2013, the state's energy department allowed single-phase consumers with rooftop systems of up to 3 kW to avail of net metering.

Karnataka

To mitigate the power crisis in Karnataka, the state government launched a multicity solar rooftop programme in January 2013. In December 2013, it invited bids for installing 0.5-1 kW solar rooftop systems across 1,943 houses in Bengaluru, Mysore, Mangalore, Hubli and Gulbarga. In this regard, the

state regulator is finalising its net metering guidelines for rooftop solar projects. The state government will provide 20 per cent subsidy to developers, in addition to the MNRE subsidy. The state is currently refining its solar policy to encourage households and entrepreneurs to generate power for

partly or fully meeting their requirements. Consumers will receive a fixed amount for every unit fed into the grid.

Other States

- In September 2013, the Uttarakhand Renewable Energy Development Agency launched the Schemes for Grid Interacted Rooftop and Small SPV Power Plants. The schemes allow for various types of arrangements for setting up rooftop solar projects like consumer-owned solar installations, solar installation owned, operated and maintained by third parties to serve the consumer, and solar installations owned by state utilities. The state has also introduced the net metering scheme and offers a preferential tariff of Rs. 9.20 per kWh.



- In the same month, Rajasthan Renewable Energy Corporation Limited invited requests for setting up 50 solar rooftop and small-scale projects of 1 MW each under the Rajasthan Solar Policy, 2011. The Power purchase agreement for the same will be signed in March 2014.
- The Haryana Renewable Energy Development Agency is promoting solar rooftop projects on commercial and industrial establishments like hotels, industrial establishments like hotels, hospitals and housing complexes to replace diesel generator sets installed for captive use during load shedding.
- Odisha has adopted a PPP model for installing solar PV panels on the rooftops of all government establishments in Bhubaneswar and Cuttack with assistance from the International Finance Corporation.
- West Bengal is promoting solar rooftop projects of 2-100 kW under its net metering scheme.



promised for solar rooftop project development. With the general election expected to take place this year, no new funds are likely to be released before a new government is formed. This will adversely impact most state-level schemes due to their heavy dependence on financial assistance from the MNRE. For instance, ANERT has not been able to implement its programme to install rooftop systems on 25,000 households. The Kerala government had set aside a subsidy of Rs. 139.3 million in the 2013-14 budget for this programme, but could not utilise it due to the MNRE's refusal to provide subsidy for these systems. The state government also tried to provide low interest bank loans to beneficiaries but it failed to elicit any response from banks. Meanwhile, most

of the projects under the 10,000 Rooftop Solar Power Plan Programme are awaiting MNRE subsidy. Thus, there is a need for state solar policies that are self-reliant and not dependent on central government grants.

Another challenge hindering the development of the solar rooftop segment is the misuse of the viability gap funding (VGF)

mechanism. Currently, there is no system for checking plant performance after the subsidy is disbursed. Industry experts believe that the VGF mechanism should be replaced with a subsidy that is disbursed over a specified time period (such as funding a fixed share of bank EMIs). Some experts also suggest aligning tariffs for commercial and high-end-residential consumers with solar rooftop project costs, thereby compelling them to either invest in installing solar rooftop systems for meeting their power needs or pay the full marginal cost of supply.

Finally, a policy for grid-connected rooftop projects needs to be complemented with timely implementation of net metering. States that have made ambitious capacity plans need to focus on addressing ground-level challenges such as grid connectivity and improving grid infrastructure.

Key issues and the way forward

The biggest challenge facing solar rooftop project developers and owners is the delay in receiving financial assistance from the central and state governments. With many channel partners continuing to offer new subsidy-based systems to consumers, there has been a lot of confusion with regard to the actual amount disbursed as subsidy.

While some state agencies like ANERT have decided to get the funds pre-approved from both the MNRE and the respective state governments before allotting projects, others like TEDA refuse to take the responsibility for providing the MNRE subsidy and transfer the entire risk to the developer.

Meanwhile, the MNRE is facing a severe shortage of funds and has put the 30 per cent capital subsidy scheme on hold indefinitely. For 2013-14, the ministry has sanctioned only 20 per cent of the funds

Source : Power Line, Vol. 18, No. 6/14



Intensive Training Programme on Implementation of ISO 50001:2011 Energy Management Systems (EnMS) For Efficient Energy Audit & Conservation Practices

National Productivity Council, New Delhi had organised an intensive training

programme on implementation of ISO 50001:2011 Energy Management Systems (EnMS)

for Efficient Energy Audit & Conservation Practice at New Delhi. The Programme was inaugurated by **Shri Harbhajan Singh, IAS, Director General, National Productivity Council**. **Mr. S N Maiti, Executive Director (Technical Services), BHEL** also addressed the participants on the importance of the ISO 50001:2011 Energy Management Systems.



Asian Productivity Organisation, Japan provided Technical Expert Services for the programme. **Mr. Ng Ha Wai, Howie,**

Technical Director of **Hong Kong Veritas Limited (HKV)**, was nominated as Technical Expert. He shared his valuable expertise and experience with the participants for implementation of ISO 50001 EnMS in their units. Mr. Ng has been instrumental in the accreditation of HKV by the Hong Kong Accreditation Services (HKAS) and the development of lead auditor training courses approved by IRCA.



NPC Energy Management Experts shared their Experience of Energy Conservation Practices, Energy Audits and implementation approach and methodology with the participants to enrich their understanding of this system.

The programme was attended by several participants

from various public sector organisations, private sector entities, defence establishment, research bodies as well as engineers from electricity distribution companies. The programme was well appreciated by the participants who expressed their satisfaction pertaining to the pedagogy and content of the programme.

"Every problem has (N+1) solutions, where 'N' is the number of solutions that you have tried and 1 is that you have not tried. That's life".

Highlights of State Level Workshop on Amended Energy Conservation Building Code

Code for the State of West Bengal held at Kolkata on 05th March, 2014

The one Day level Workshop on Amended Energy Conservation Building Code (ECBC) was organized by National Productivity Council on behalf of West Bengal State designated at Kolkata on 5th march, 2014. The program was inaugurated by Shri N.S. Nigam, IAS, Chairman & Managing Director, WBSEDCL, Shri Girija Shankar. Over 60 delegates attended and participated in the workshop, which brought together the Policy makers, representative from BEE, Government planners from Municipalities/ Urban local bodies, State Urban Development Authority, SDA Architects, Representative from various State Government Departments including engineers, Academicians, Architects and Consultants.

The Speakers during the workshop were invited from Bureau of Energy Efficiency (BEE), Jadavpur University, Central Glass & Ceramic Research



Institute, Kolkata and ECBC Architects to deliberate of the required amendments.

In the Technical Panel Discussion and Valedictory Session Various Technical as well as issues related to practical implementation of the Code were raised by the eminent speakers and participants to take this concept in a big way and make another step towards Sustainable Habitat.



Labour Productivity Growth By Industry 2000-2010 (Average Annual Growth Rate of Industry Labour Productivity)

TABLE 1 : AGRICULTURE

Countries	Value in Percentage
China	6.7
India	2.5
Indonesia	3.1
Iran	1.8
Japan	0.9
Korea	4.9
Malaysia	2.7
Phillippines	1.2
Singapore	-6.9
Thailand	1.5
Vietnam	3.7
US	4.1

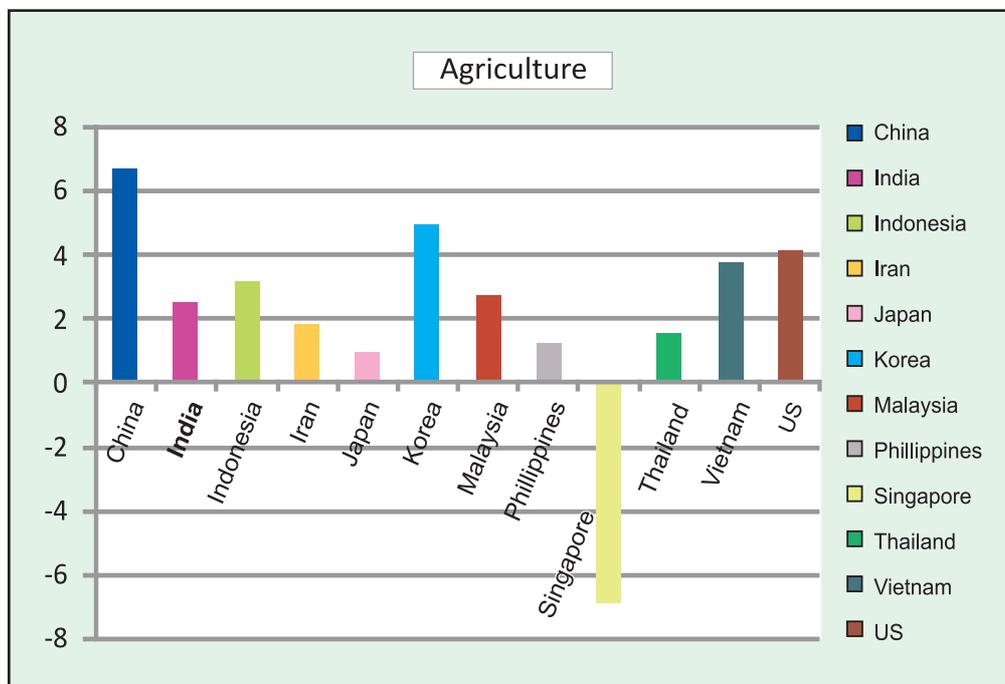


TABLE 2 : MINNING

Countries	Value in Percentage
China	9.0
India	1.5
Indonesia	-3.0
Iran	1.2
Japan	-1.1
Korea	-3.3
Malaysia	-7.2
Phillippines	4.5
Singapore	0.0
Thailand	5.9
Vietnam	1.1
US	-2.2

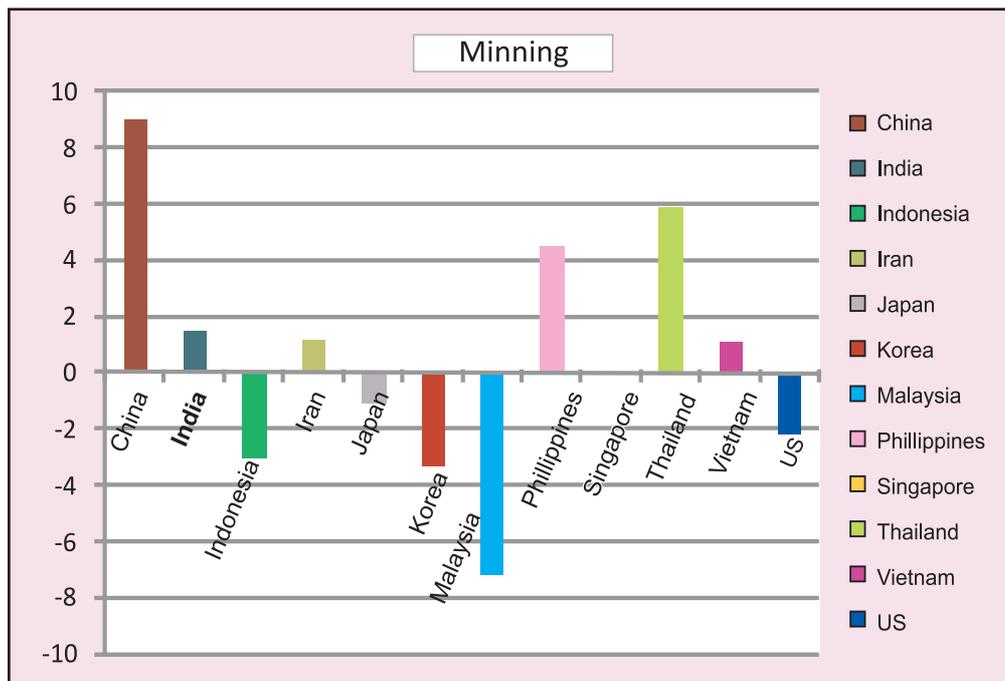


TABLE 3 : MANUFACTURING

Countries	Value in Percentage
China	8.0
India	3.4
Indonesia	2.5
Iran	6.0
Japan	3.7
Korea	6.8
Malaysia	4.2
Phillippines	2.8
Singapore	3.9
Thailand	4.0
Vietnam	3.7
US	5.1

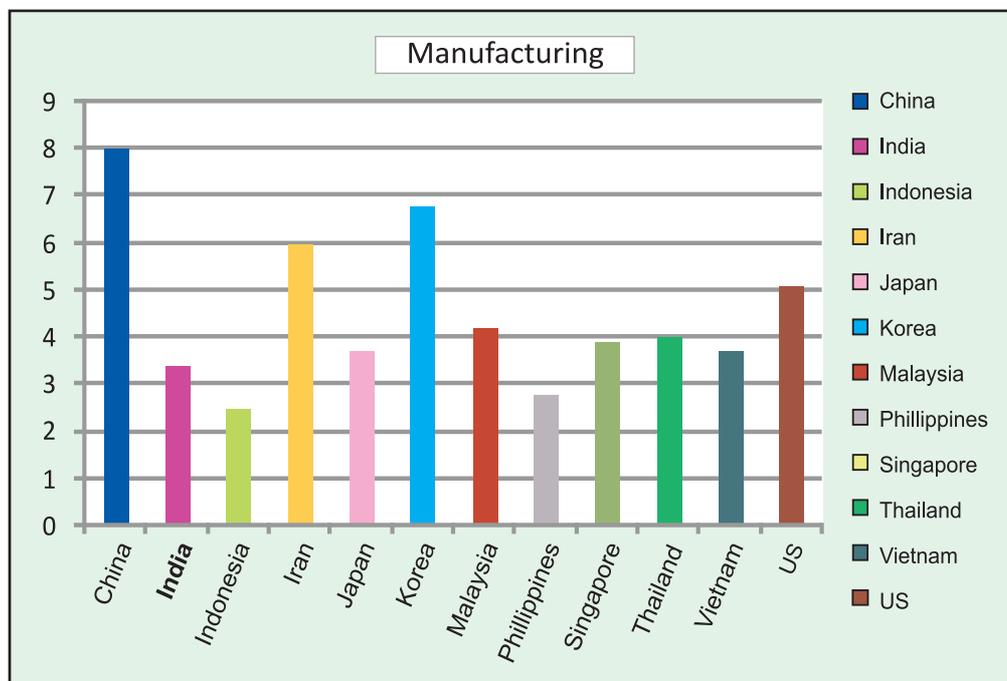


TABLE 4 : ELECTRICITY, GAS AND WATER SUPPLY

Countries	Value in Percentage
China	8.1
India	3.1
Indonesia	4.0
Iran	6.0
Japan	1.0
Korea	3.4
Malaysia	-4.4
Phillippines	1.0
Singapore	1.2
Thailand	6.1
Vietnam	1.4
US	0.9

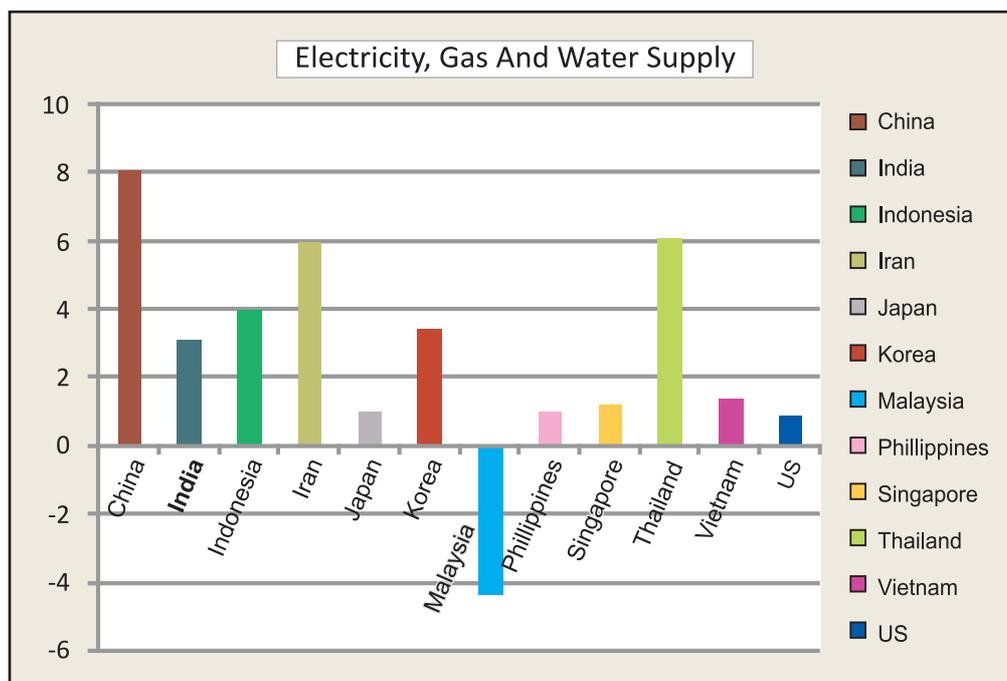


TABLE 5 : CONSTRUCTION

Countries	Value in Percentage
China	7.6
India	6.4
Indonesia	1.9
Iran	-1.1
Japan	-0.5
Korea	1.0
Malaysia	-0.9
Phillippines	1.6
Singapore	0.1
Thailand	-0.7
Vietnam	-1.5
US	-2.3

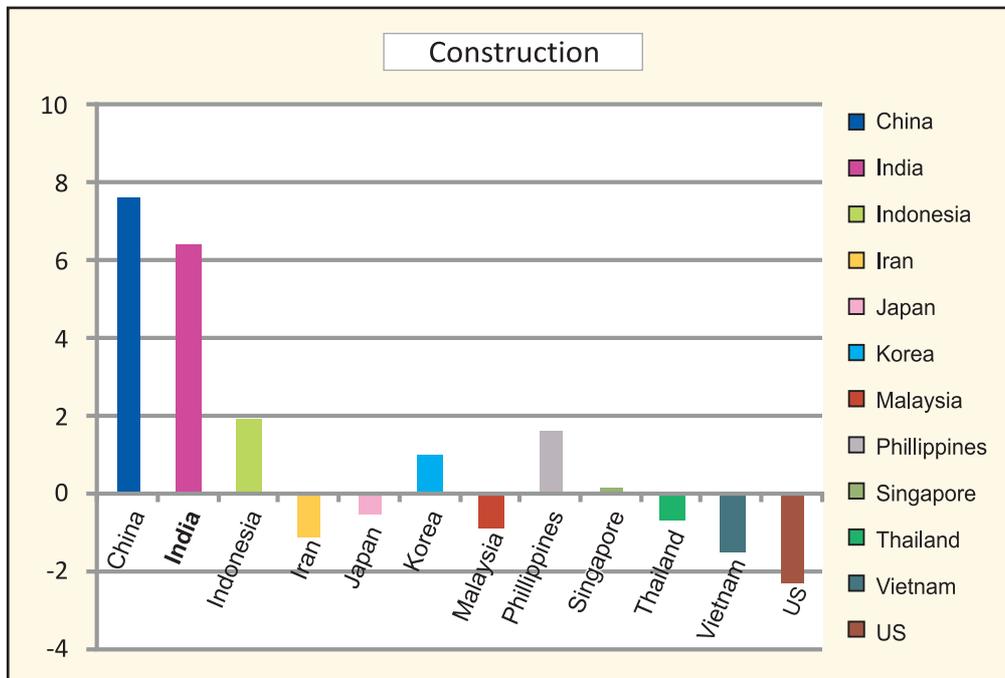


TABLE 6 : WHOLESALE & RETAIL TRADE, HOTELS AND RESTAURANTS

Countries	Value in Percentage
China	8.3
India	6.1
Indonesia	3.7
Iran	0.9
Japan	-0.6
Korea	2.9
Malaysia	1.8
Phillippines	-0.7
Singapore	2.4
Thailand	0.0
Vietnam	3.0
US	1.9

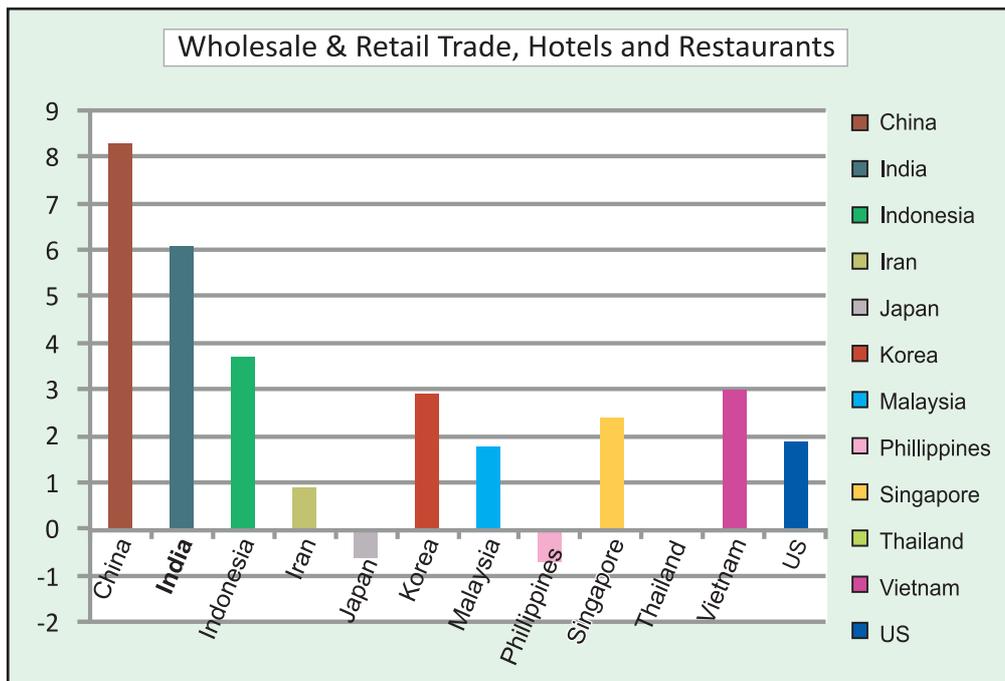


TABLE 7 : TRANSPORT, STORAGE AND COMMUNICATIONS

Countries	Value in Percentage
China	7.1
India	9.5
Indonesia	9.9
Iran	3.9
Japan	0.8
Korea	0.7
Malaysia	0.6
Phillippines	3.8
Singapore	0.5
Thailand	4.3
Vietnam	5.3
US	4.9

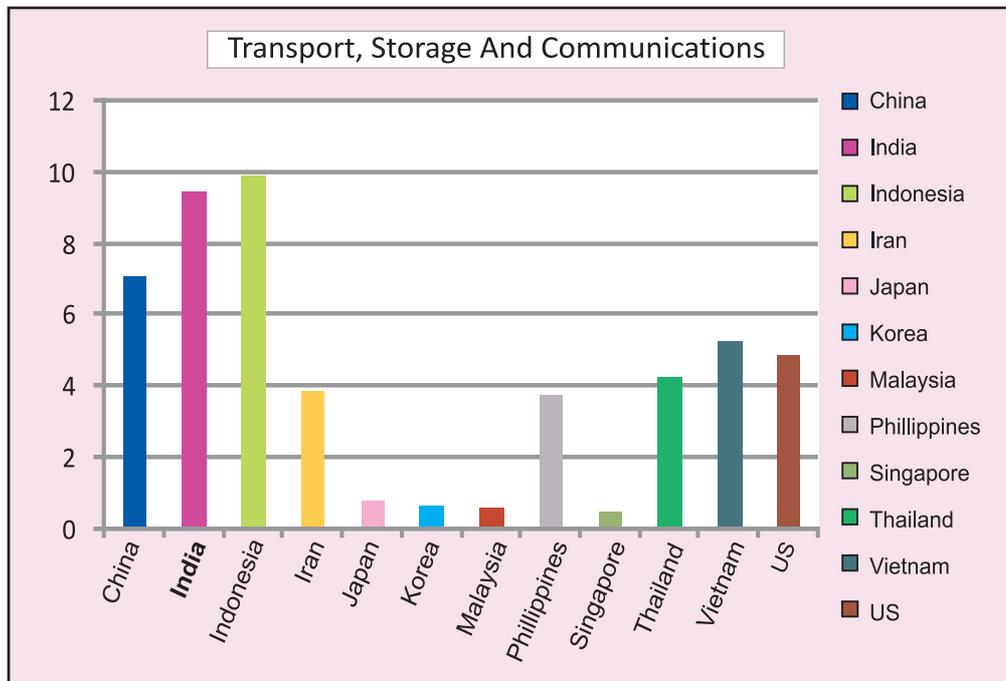


TABLE 8 : FINANCE, REAL ESTATE AND BUSINESS ACTIVITIES

Countries	Value in Percentage
China	8.9
India	6.8
Indonesia	-0.4
Iran	1.0
Japan	0.7
Korea	-0.6
Malaysia	-0.8
Phillippines	-2.7
Singapore	-0.4
Thailand	1.6
Vietnam	-8.3
US	2.0

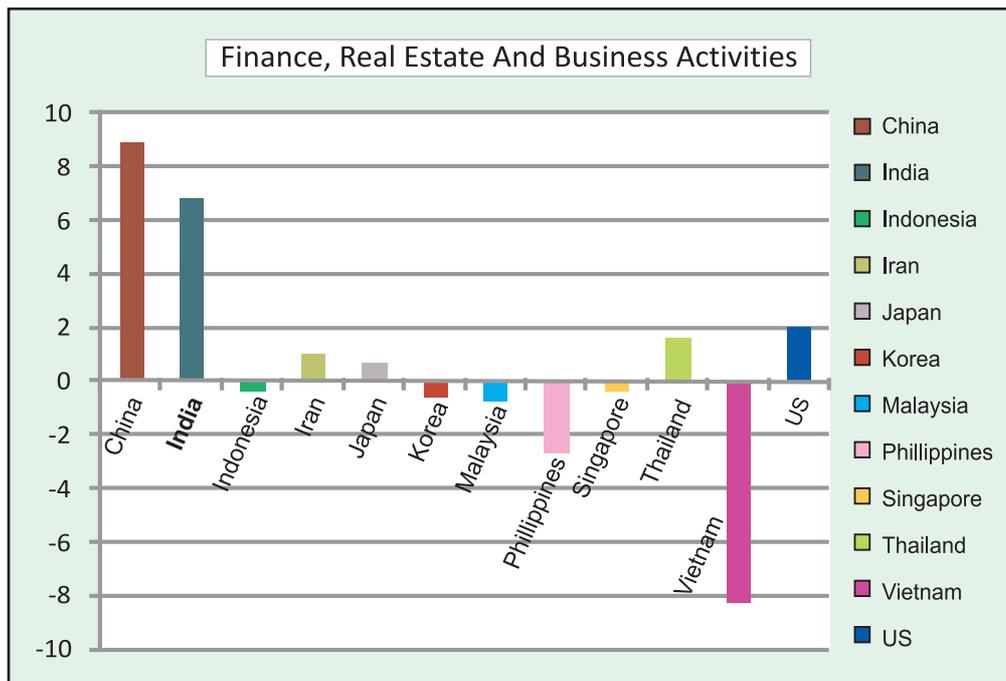
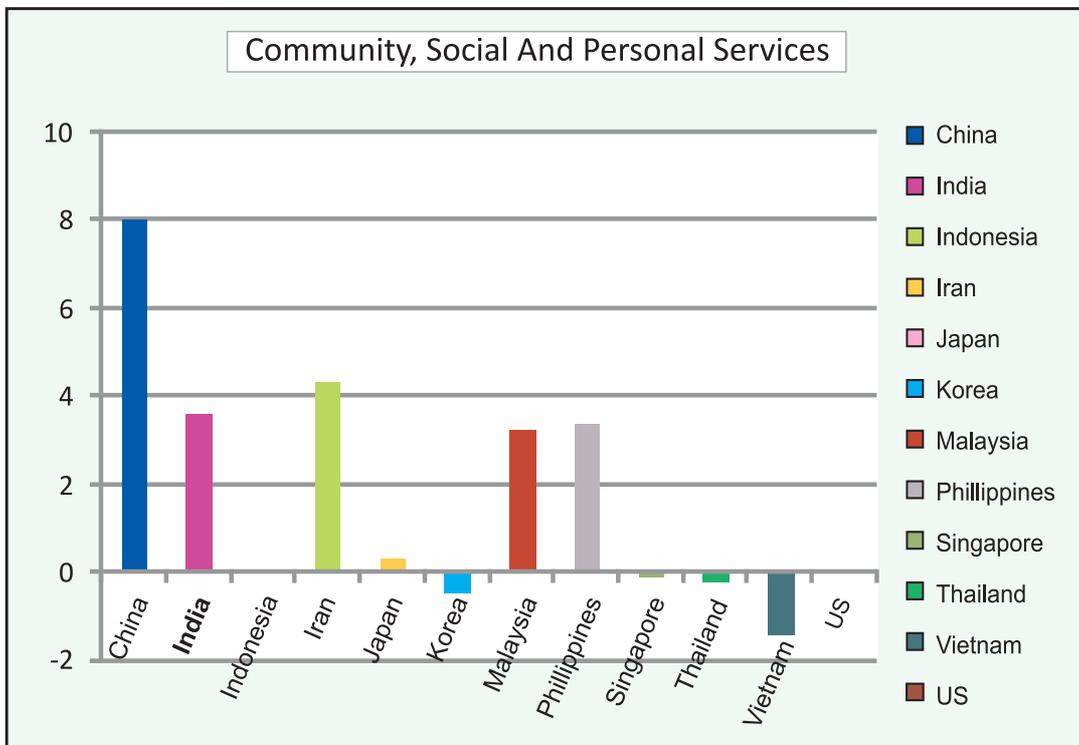


TABLE 9 : COMMUNITY, SOCIAL AND PERSONAL SERVICES

Countries	Value in Percentage
China	8.0
India	3.6
Indonesia	0.0
Iran	4.3
Japan	0.3
Korea	-0.5
Malaysia	3.2
Phillippines	3.4
Singapore	-0.1
Thailand	-0.2
Vietnam	-1.4
US	0.0



Source: APO Productivity Databook 2011 Compiled by: Nitin Aggrawal, Dy. Director, NPC

There can be no doubt that water is sine-qua-non for all agricultural activities world-wide. However, access to water is a critical factor for irrigation, especially for rural poor. In India, an unpredictable monsoon coupled with an increasing demand for food production, (at the self-sustenance as well as commercial levels) has induced an imperative need for irrigation options other than those that are either extremely laborious and time consuming or simply too expensive for the smallholder farmers. So, while the rich farmer banks on costly systems such as electric and diesel pumps to extract groundwater for irrigating their large acres of land, the smallholder farmer has no option other than using the tedious traditional water lifting devices to irrigate their small holdings.

Over the years, Gramodaya Rachnatmak Vikash Sansthan, with the help of Petroleum Conservation Research Association (PCRA) has worked to improve the livelihoods of the rural poor through promoting appropriate affordable income generating technologies leading to additional wealth creation for the stallholder framers. The low cost water lifting technology, also called the treadle pump promoted by Gramodaya Rachnatmak



Low Cost Water Lifting Technology: Tool for Poverty Eradication

Viksah Sansthan, has several key advantages over the traditional water lifting devices and the costly diesel and electric pumps for the stallholder farmer.

Of paramount significance is the affordability factor which makes this technology accessible for the smallholder farmers. The treadle pump is

- Easy to install and operate
- Light and portable
- Sturdy and durable
- Negligible repair and maintenance cost
- Has a 5 inch (each) twin barrel diameter
- Is made of CRC sheet and weighs approximately 18 kg
- Is ideal for lifting water from water table depth ranging upto 5 m (maximum lift 8 m)
- Is also used for surface water extraction by connecting a PVC section pipe for the pump with



GI bed pipe

- Has water output of approximately 5000-6000 liters per hour (depending on user's body weight)
- Market areas in India include Orissa, West Bengal, U.P., Jharkhand and Chhattisgarh.

SOME FACTS

The treadle pump (commonly known as pedal pump) is a low-lift high capacity human-powered pump water lifting device similar in principal to the hand pump. A hand pump consists of a single barrel or cylinder with water being pumped using one's hands, whereas the pedal pump comprises two cylinders and requires foot operation for lifting water, hence called a pedal pump. A gender friendly technology, the treadle pump employs the user's body weight and leg muscles in a comfortable walking motion making the use of the pump sustainable for extended periods of time without excessive fatigue. One may even make a comfortable sitting arrangement and pedal while being seated.

The pump is usually installed on 15" tube wells (made of GI, PVC or bamboo) but can also be fitted on 3" to 5" tube well (by using relevant reducer sockets) that are meant for installing electric and diesel pumps respectively. Besides, most of the models of the treadle pump can be used for drawing surface water, such as from ponds, canals, streams and open wells (by connecting a suction pipe to the pump with an elbow shaped pipe). All models of treadle pump mentioned have a life span of approximately 4-6 yrs.

The treadle pump is appropriate for irrigating about one acre of cultivable land and, hence, is ideal for vegetable cultivation. However, farmers use the pump to cultivate paddy, wheat, oilseed and even sugarcane in some areas. Groundwater resource management has become a major concern on the part of development voluntary organization. High tech macro irrigation systems that were

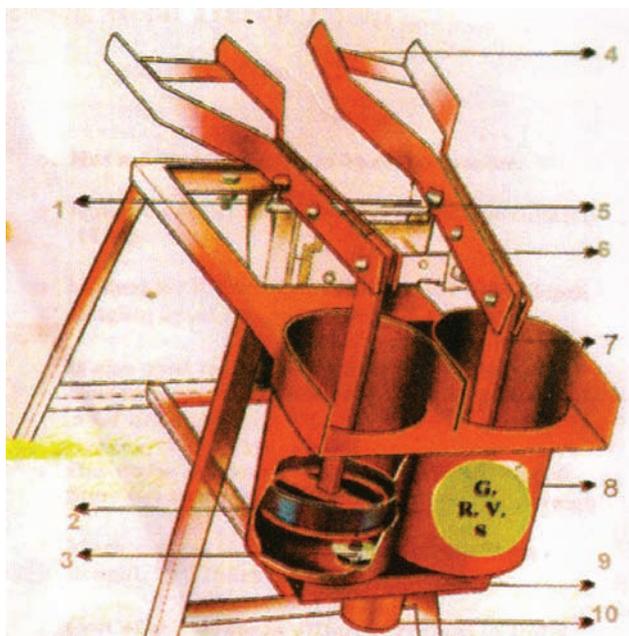
THE MECHANICAL PARTS

Cylinder Diameter	5 inch
No. of Cylinders	2 (Fixed pair left to right)
Rubber Valves	2 nos
Socket between 2 valves	½ inch dia
Water flowing plate	10 inch (Fixed with pump)
Separator wall of the cylinder dia	2 cm thick & 2inch high
Piston	2 nos for 2 cylinders
Length	10 inch
Diameter of piston	4 inch
Washer	2 nos for 2 Piston
Metal pedals	1 pair (Left & right)
Lever	1 nos
Metal Stand	2 ft
Socket	½ inch dia
GI suction pipe	1 ½ inch dia + 5 ft ling pipe
PVC pipe	1 ½ inch dia + 20 ft ling pipe
PVC pipe drilled	1 ½ inch dia + 20 ft ling pipe
Polythene net	60 ft long x 4 inch breadth
Nylon chord	50 ft long
Centre shocket	1 ½ inch - 1 No
Nuts & Bolts	12 Nos

FUNCTION OF DIFFERENT PARTS

Cylinder	holding water coming from suction pipe
Rubber Valve	Valvular function
Water flowing plate & separator	Channelise water flow
Piston	Pumping up water by suction
Washer	Fixed on piston head for effective suction
Pedals	Pistons are driven by pedals
Metal Stand	Installation and foundation of pump set
Socket	joining GI pipe with cylinder
GI Section pipe	Vertical flow of water & strengthen PVC pipe
PVC pipe	Vertical flow of water & strengthen PVC pipe
Drilled PVC pipe	Filtered water enters through drilled holes
Polythene Net	Filtration of water
Nylon chord	Fixing the net on drilled PVC
Adhesive solution	Fixing PVC pipe
Central Socket	Joining PVC pipe with GI pipe
PVC Cap	Prevents entry of pebbles and mud with water underground
Nuts & Bolts	Joining the piston, Joining the lever, Joining Pedals, Joining the stand & cylinder

5" METAL TREADLE PUMP



adopted in the 1950 and 1960 badly affected the ground water table and distanced the poor and the marginal farmers from gaining access and control over groundwater resources. It was both capital intensive and technologically hazardous. Under this technology, poor farmers could never become owners. They rather became servants.

Treadle pumps have proved to be appropriate alternative rural technology for groundwater resource use and management. Instead of macro irrigation which feed big farms, treadle pumps provide micro irrigation to even smallest patch of land and make it useful for vegetable production.

Treadle pumps have ensured sustainable social and economic development of the poor and marginalized farmers by enabling them gain access to appropriate technology. treadle pumps have also benefitted the resources of poor women farmers by enabling them access to micro irrigation. Economic and social impacts of treadle pump on the poor and marginal farmers are immense. Some of these are: enhanced productivity for small holdings; food security and nutrition to the poor; increased production of vegetable crops; and availability of drinking water for

animals and allied household water use.

The experimentation with treadle pumps was demand driven. This has stimulated a lot of interest on the part of the development administrators of Deoria, Kushinagar, Gorakhpur and Maharajganj districts of Uttar Pradesh. The demonstration effect of the treadle pumps has extended beyond the boundary of the state to Betia and Gopalgunj districts of Bihar.

SPECIAL FEATURES OF TREADLE PUMP

- Zero use of power and fuel
- Per 30 mt use of TP saves 0.23 litre diesel
- Even child can operate
- Low cost technology
- Appropriate rural technology
- No operational cost
- Environment friendly
- Non polluting technology
- Poor friendly
- Light maintenance
- Can be operated at any time
- Rational use of water
- Suitable for vegetable cultivation & Kitchen gardening
- Can be installed at any place
- Space efficient
- Saves time and health hazards
- Easy to maintain
- No sound pollution
- Round the year service
- Labour intensive
- Afford able cost
- Saves water loss through percolation and evaporation
- High customer demand
- Water lifting capacity 2-3 litre per second

Source : ACT, 10-12/13



CONFERENCE OF LOCAL PRODUCTIVITY COUNCILS

The conference of local productivity councils (LPCs) was organized at NPC hqrs. conference Hall on 20th February, 2014. 26 representatives from 14 local productivity councils

and Group Heads of NPC Hqrs., former DG and DDGs of NPC participated in the conference.

In his initial remarks in the Inaugural session, **Shri Harbhajan Singh, IAS, Director General, NPC**

emphasized that NPC and LPCs have to re-define their roles, to be relevant, due to the changes in the economic and industrial scenario.

The Conference was inaugurated by Dr. E.M. Sudarsana Natchiappan, Hon'ble Minister of state for Commerce & Industry, Govt. of India. The Hon'ble Minister also presented the LPC awards and individual awards for life-time contribution to the productivity movement, to the various recipient from LPCs (2 LPC awards and 5 individual awards).



The Hon'ble Minister during his inaugural address impressed upon the productivity movement to involve the youth in the forums of productivity movement as they comprise a large proportion of the population. He also exhorted to spread the institutional mechanism of productivity movement by having at least one LPC in every State. He also suggested that the LPCs should try to create and maintain productivity data of various sectors at their local levels and these data can be consolidated at different levels and can be shared through the internet media and websites which will help in formulation of various policies.

The Conference comprised two technical sessions. The first technical session on "Overview of NPC/LPCs activities" was initiated with a presentation on the features of the "Lean Manufacturing Competitive Scheme" for MSMEs, executed by NPC and the possible roles that can be played by LPCs in the project. This was followed by presentations by the LPCs about the various activities being carried out by them for their clients.

The second technical session had the representatives from LPC's making presentations providing



suggestions on the subject of "Emerging Areas for Productivity Services and NPC-LPC Joint Activities. The salient suggestions made are as follows :

- Formulation of a 'Productivity Vision - Policy' document to provide policy framework to the Government.
- Formulation and execution of productivity services in the new areas of Education, Health, Govt. Service Delivery etc.
- Larger networking with other National and International Institutions.
- Organization of major national event on "Productivity" to be jointly hosted by NPC and LPCs.
- Creation of database of productivity services offered by LPCs and NPC.
- In-country study mission to be organized to facilitate LPCs to learn from each other.

In the concluding session, DG, NPC stressed the need for working together between NPC and LPCs and develop competence in new 'niche' areas where others are not offering services. He also emphasized for organization of events involving different connected stakeholders like industry, Government, suppliers etc. and publish the proceedings of such events for wider publicity.



National Workshop on Technological Developments in Efficient Operation & Maintenance of Boilers at Pune

National Productivity Council conducted a two day National Workshop on "Technological Developments in Efficient Operation and Maintenance of Boilers" on 6th & 7th February, 2014 at Pune under the aegis of Central Boilers Board, DIPP, Gol. The objective of the workshop was to discuss and disseminate information on latest developments in technologies available for effective and efficient operation of boiler and for renovation and modernization of boilers, GHG reductions and also on the strategies for enhancing competitiveness. The workshop was attended by about 250 delegates representing manufacturing and user Industries.



Shri Harbhajan Singh, IAS, DG, NPC inaugurated the workshop while Shri T.S.G. Narayannen, Secretary, Central Boilers Board, DIPP delivered the theme address. Shri Satish Badhe, Director, Directorate of Boilers, GoM also addressed the participants.

The workshop was sponsored by leading boiler manufactures and major boiler users in the country namely BHEL, NTPC, Hindustan Paper, Industrial Boilers, Thermax and Forbes Marshall, who also



actively participated in the workshop.

The interactive workshop covered various topics on boiler technologies and issues concerning efficient operation, maintainace and safety aspects in boiler operations.

In the concluding session chaired by Shri T.S.G. Narayannen, Secretary, Central Boilers Board various issues raised by the industry both, boiler manufacturers and users, were deliberated upon and recommendations were evolved for further necessary action by the Central Boilers Board. A souvenir & Proceedings was also released during the workshop.





20 djkM#i ; s[kpZdj ds
f' lo xaxkesLFkfi r
rfeyukMq dsi Fke
Li kbl d i kdZdk
mn?kkVu dk Zl a™k

स्पाइसेस पार्क: किसानों के लिए संघ सरकार की समर्थक पहल -वाणिज्य मंत्री जी ने कहा

बीस करोड़ की लागत से शिवगंगा में स्थापित तमिलनाडु के प्रथम सपाइसेस पार्क का उद्घाटन किया गया। श्री आनंद शर्मा, वाणिज्य एवं उद्योग मंत्री जी, अध्यक्ष, राष्ट्रीय उत्पादकता परिषद्, ने कहा—“देश में स्पाइसेस पार्क भारत सरकार की अपनी जिम्मेदारी की एक प्रमुख पहल है कि देश में किसी भी प्रकार का विकास विशेष रूप से कृषि में अधिक और किसान के पक्ष में होना चाहिए”। आज यहाँ तमिलनाडु के प्रथम स्पाइसेस पार्क का उद्घाटन करते हुए उन्होंने कहा कि इस पार्क का मुख्य उद्देश्य फसल कटाई के बाद की और मसालों की प्रसंस्करण-प्रक्रियाओं दोनों के लिए आम बुनियादी सुविधाओं को प्रदान करना है। पिछड़े क्षेत्रों को समाहित करके उन्हें ग्रामीण रोजगार प्रदान करना भी इसका लक्ष्य है। मंत्री जी ने कहा—“यह पार्क कृषकों और व्यापार समुदाय को अच्छी कृषि प्रथाओं को अपनाने के लिए शिक्षा प्रदान करने में मदद करेगा जिससे वे आयातक देशों द्वारा निर्धारित गुणवत्ता मानकों को पूरा कर सकें। मंत्री जी ने व्यक्त किया कि पिछले कई वर्षों के दौरान स्पाइसेस बोर्ड के निरंतर प्रयासों से भारत से मसालों का निर्यात तीन गुना बढ़ाने में मदद मिली है। देश से मसालों के निर्यात के इतिहास में यह पहली बार है, जबकि 2012-13 के दौरान परिमाण में वृद्धि पिछले वर्ष के मुकाबले सभी रिकार्डों को तोड़ते हुए 22 प्रतिशत दर्ज की गई है। 2012-13 अवधि के दौरान पहली बार मसालों के कुल निर्यात ने 10,000 करोड़

रु. का आंकड़ा पार किया है। रुपये में 11,171 करोड़ और डॉलर के संदर्भ में 2.04 अरब अमरीकी डॉलर प्राप्त कर लिया गया है। वर्तमान तौर पर भारत दुनिया में मसालों का सबसे बड़ा उत्पादक, उपभोक्ता और निर्यातक है। मंत्री जी ने कहा कि मसालों के विश्व व्यापार में भारत का योगदान मात्रा में 48 प्रतिशत और मूल्य में 43 प्रतिशत है।

वर्तमान वैश्विक वातावरण में सफल व्यापार चलाने के लिए गुणवत्ता एक ट्रेडमार्क बन गया है और प्रमुख उपभोक्ता उत्पादक देशों से अधिक से अधिक गुणवत्ता अनुपालन की मांग कर रहे हैं। यह विचारणीय है कि इन उपभोक्ता देशों द्वारा स्थापित कड़े गुणवत्ता प्रतिमानों का सामना करने में भारत सक्षम रहा और विभिन्न गुणवत्ता सुधार कार्यक्रमों द्वारा बाजारों में हमारे निर्यात का हिस्सा बनाये रखा गया और बढ़ाया भी गया। लेकिन इन देशों में हाल ही के दौरान लागू गुणवत्ता सुधार ने हमें निष्पादित स्तर के परे जाने के लिए मजबूर बनाया है। इस चुनौती का सामना करने के लिए हमें अपने आप को उन मसालों का उत्पादन और विपणन करने के लिए तैयार करना होगा जिन्हें अंतर्राष्ट्रीय स्तर पर खाद्य सुधार मानकों द्वारा स्वीकार कर लिया जाए।

माननीय वित्त मंत्री श्री पी. चिदंबरम, जिन्होंने शिवगंगा में स्पाइसेस पार्क स्थापित करने में अहम भूमिका निभाई थी, ने कृषक समुदाय

से इन सुविधाओं का पूरा उपयोग करने का आह्वान किया। उन्होंने आशा व्यक्त की कि यह पार्क इस क्षेत्र में उगाई जाने वाली हल्दी और मिर्च के प्रसंस्करण में क्रांतिकारी परिवर्तन लायेगा।

स्वागत भाषण देते हुए स्पाइसेस बोर्ड के अध्यक्ष डॉ. ए. जयतिलक ने कहा कि शिवगंगा पार्क निर्यात योग्य मसालों जैसे कि हल्दी, मिर्च, कालीमिर्च के अतिरिक्त उत्पादन, के प्रसंस्करण की सुविधा प्रदान करता है जिसके लिए स्पाइसेस बोर्ड ने राज्य सरकार की भागीदारी के साथ राष्ट्रीय बागवानी मिशन व राज्य बागवानी मिशन के तहत लागू करने के लिए तमिलनाडु के विकास की एकीकृत परियोजना का प्रस्ताव किया है। बोर्ड इस परियोजना के तहत एच एम के साथ मसालों की फसल-कटाई के समय और कटाई के बाद के क्रियाकलापों में बारीकी से जुड़ा रहेगा। डॉ. जयतिलक ने कहा कि तमिलनाडु देश में हल्दी का दूसरा सबसे बड़ा उत्पादक है जिसने 2012-13 के दौरान राजस्व निर्यात में 80,050 टन से 540 करोड़ रुपये का रिकार्ड पाया था।

तमिलनाडु के कृषि राज्यमंत्री श्री एस.दामोदरन और शिवगंगा के एम.एल.ए. श्री गुणशेखरन भी उपस्थित थे।

शिवगंगा तालुका के कोत्तगुडी गांव में यह पार्क 30 हेक्टेयर में फैला हुआ है, 20 करोड़ रुपए के शुरुआती निवेश के साथ इसमें भंडारण से लेकर भाप स्टेरिलाइजेशन तक की पूरी बुनियादी सुविधाएं हैं। इसका प्राथमिक ध्यान प्रीमियम मूल्य प्राप्त करने के लिए किसानों को अपने ही स्तर पर उन्नत मूल्य योजन हेतु सक्षम बनाना है। यह पार्क प्रसंस्करण की सुविधा प्रदान करता है जो कि मसालों की खेती की मांग को पूरा करने के लिए प्रोत्साहित करेगा और अधिक प्रोसेसर सुविधाओं को स्थापित करने में शिवगंगा पार्क, विशेष रूप से मिर्च और हल्दी के प्रसंस्करण और मूल्य योजन का केन्द्र बनने की परिकल्पना की जा सकती है और आसपास के जिलों में मसालों की खेती का विस्तार करने की काफी गुंजाइश बन गयी है।

व्यक्तिगत प्रसंस्करण सुविधा विकसित करने के लिए सात निर्यातकों को ग्यारह एकड़ जमीन आबंटित की गयी है। 30 एकड़ भूमि भावी निर्यातकों के लिए आबंटित की जाएगी। पार्क में भूमि का आबंटन पूरा करने के बाद 15 से अधिक प्रसंस्करण इकाइयाँ पार्क परिसर के भीतर स्थापित की जाएंगीं और कृषक समुदाय अपनी उपज बेचने के लिए निर्यातकों से सीधा संपर्क स्थापित कर सकते हैं जिसके द्वारा किसानों को बिचौलियों के हट जाने से बेहतर मूल्य प्राप्त होता है। इससे निर्यातकों को निरंतर अच्छी गुणवत्ता वाले मसालों की आपूर्ति सुनिश्चित होगी। स्पाइसेस पार्क के दस्तावेजों से सप्लाय चैन में पारदर्शिता स्थापित करने में मदद मिली है और स्थानीय रोजगार का सृजन हुआ है।

पार्क पूरी तरह से मिर्च और हल्दी के जिसमें प्रति घंटा एक टन की क्षमता सहित प्रसंस्करण की बुनियादी सुविधा है। इसके अलावा बैच प्रक्रिया में 250 किलोग्राम/घंटा क्षमता की भाप विसंक्रमण सुविधा भी है।

rfeyukMq dks ykk

शिवगंगा स्पाइसेस पार्क का उद्देश्य तमिलनाडु में उत्पादित हल्दी और मिर्च के लिए बुनियादी ढाँचा और प्रसंस्करण की सुविधाओं का निर्माण करना है। राज्य देश के कुल उत्पादन में लगभग 10 प्रतिशत मसालों का हिस्सा रखता है। जहाँ तक हल्दी का सवाल है, तमिलनाडु दूसरा सबसे बड़ा उत्पादक है और राज्य में हल्दी का औसत उत्पादन प्रतिवर्ष तीन लाख टन से अधिक है। यह पर्याप्त



मात्रा में मिर्च का भी उत्पादन करता है।

Li kbl d i kdZdh vo/kj .kk

भारत दुनिया में मसालों का सबसे बड़ा उत्पादक, उपभोक्ता और निर्यातक है और 65 से अधिक मसालों का उत्पादन करता है। भारत मसालों के कुल विश्व व्यापार में महत्वपूर्ण हिस्सा बांटता है और मसालों के कुल व्यापार में 48 प्रतिशत और मूल्य में 43 प्रतिशत हिस्सा रखता है। प्रमुख उपभोक्ता देश जैसा कि यूरोप, यूएसए आदि उत्पादक देशों से अधिक गुणवत्ता अनुपालन की माँग कर रहे हैं। भारत इन उपभोक्ता देशों द्वारा स्थापित नई कड़ी गुणवत्ता-शर्तों का सामना करने में सक्षम था और बाजार में हमारे निर्यात की हिस्सेदारी को बनाए रखने और बढ़ावा देने के लिए बोर्ड द्वारा विभिन्न गुणवत्ता सुधार कार्यक्रम शुरू किए गए हैं। लेकिन हाल ही के दौर में इन देशों में गुणवत्ता सुधार को निश्चित रूप से आगे जाना होगा और उन्हें ही अस्तित्व में लाना होगा जो केवल



उपभोक्ताओं की आकांक्षाओं को पूरा कर सकते हैं। स्पाइसेस पार्क आगे देश में गुणवत्ता वाले मसालों का उत्पादन और विपणन करने के लिए अधिकाधिक सुविधाओं का समर्थन करेगा जो कि अंतर्राष्ट्रीय स्तर पर खाद्य सुरक्षा मानकों द्वारा स्वीकार कर लिया जाए।

Li kbl d i kdZ ds LFku vls Ql y

स्पाइसेस पार्क देश के 10 प्रमुख मसाला उत्पादक/विपणन केन्द्रों में स्थापित किए जा रहे हैं। इसके स्थान निम्नानुसार हैं:-

Li kbl d i kdZ ea mi y Ck l qo/kk j

स्पाइसेस पार्क मसाले उद्योगों के विकास के लिए एक आधार के रूप में कार्य करेगा। इस अवधारणा का मूलभूत उद्देश्य, फसलोत्तर और मसालों के प्रसंस्करण संचालन दोनों के लिए सामान्य बुनियादी सुविधाओं को प्रदान करना है। इसका उद्देश्य पिछड़े तबके के लोगों का उन्नयन और ग्रामीण रोजगार उपलब्ध कराना भी है। सभी स्पाइसेस पार्कों में अंतर्राष्ट्रीय मानकों की प्रसंस्करण, ग्रेडिंग, पैकिंग आदि शामिल हैं। उपरोक्त सुविधाओं के अतिरिक्त बोर्ड आम बुनियादी सुविधाओं का जैसे कि सड़क, पानी की आपूर्ति प्रणाली, बिजली स्टेशन, अग्निशमन एवं नियंत्रण यंत्र, वे-ब्रिज, कुड़ा-करकट उपचार संयंत्र, बैंक काउंटर, रेस्तराँ, व्यापार केंद्र, गेस्ट हाउस आदि का विकास भी करेगा।

स्पाइसेस पार्क कृषक/व्यापार समुदाय को शिक्षाप्रद सेवाएं प्रदान करने में सक्षम होगा। स्पाइसेस पार्क किसानों को अच्छी कृषि प्रथा, जैसेकि फसल कटाई से पूर्व की कार्य प्रणालियों, उन्नत संसाधन प्रथाओं और वैश्विक सुरक्षा और गुणवत्ता मानकों पर प्रशिक्षण कार्यक्रम की सुविधा प्रदान करता है।

l koZ fud@fut h l gHkxrk

बोर्ड स्पाइसेस पार्क में उपलब्ध भूमि उद्यमियों को मसालों के मूल्य योजना के लिए अपने प्रसंस्करण यूनिटों के विकास हेतु 30 साल की अवधि के लिए लीज पर देगा, जिससे उत्पादक इन सुविधाओं का उपयोग करके अपनी उपज को सीधे निर्यातकों को बेच सकें ताकि वे अपने उत्पादों के लिए प्रीमियम मूल्य का लाभ उठा सकें। दूसरी तरफ निर्यातक अपने कारोबार के लिए कच्चे माल की निर्बाध आपूर्ति हेतु विश्वसनीय कृषक समुदाय के साथ संबंध स्थापित कर सकते हैं। इसके अलावा निर्यातकों द्वारा प्रसंस्करण संयंत्रों की स्थापना से स्थानीय रोजगार के अवसर पैदा होंगे।

LFku	jkT;	vUrxt vluokys el kys
छिंदवाडा	मध्यप्रदेश	लहसुन और मिर्च
पुट्टडी	केरल	कालीमिर्च और इलायची
गुंटूर	आंध्रप्रदेश	मिर्च
शिवगंगा	तमिलनाडु	हल्दी और मिर्च
गुना	मध्यप्रदेश	बीजीय मसाले
मेहसाना	गुजरात धनिया	जीरा,सौंफ और
जोधपुर	राजस्थान	जीरा और धनिया
कोटा	राजस्थान	धनिया
राय बरेली	उत्तरप्रदेश	पुदीना
हमीरपुर	हिमाचल प्रदेश	हल्दी और अदरक

Li kbl d i kdZ f' loxak ea LFkfi r l qo/kk a

- सभी सामान्य बुनियादी अवसंरचनाएँ
- अग्निशमन एवं नियंत्रण यंत्र
- वे-ब्रिज
- पार्क का प्रशासनिक कार्यालय
- गेस्ट हाउस
- कैटीन भवन
- बैठक हॉल
- बैंक काउंटर
- गोदाम (कुल क्षेत्रफल 3200 वर्ग मीटर.)

स्रोत: स्पाइस इण्डिया

गुजरे वर्ष पर निगाह डाली जाए तो यह कृषि के लिए कोई सुखद वर्ष नहीं कहा जा सकता, कारण कि हमने कृषि पर चोट करती प्राकृतिक आपदाओं को झेला। उत्तराखण्ड, विदर्भ, असम, बिहार जैसे राज्यों का नाम आने की कसक और गहरा जाती है। बड़े क्षेत्र में खेतों से लहर-लहर लहराने वाली फसलें गायब थीं। मगर देश कृषि के क्षेत्र में इतना संपन्न और सुदृढ़ हो चुका है कि हम खाद्यान्न मोर्चे पर डिगे नहीं, हमारे पॉव जमे रहे। दो राय नहीं कि कृषि के समक्ष गंभीर चुनौतियां मुंह बाएं खड़ी हुई थी मगर हमने नवीनतम और कारगर देशज प्रौद्योगिकियों के दम पर उनका मुंह तोड़ जवाब भी दिया। यह देश के विभन्न संस्थानों द्वारा विकसित कृषि प्रौद्योगिकियों की सफलता का ही प्रमाण है कि कृषि उत्पादन में वृद्धि हुई। ग्यारहवीं पंचवर्षीय योजना के दौरान 3.3 प्रतिशत की चक्रवृद्धि विकास दर के साथ खाद्यान्नों, फलों खनिजों, दूध, अंडे और मछलियों का रिकार्ड उत्पादन हासिल किया गया।

परियोजना प्रारंभ हुई जिसने कृषि विज्ञान केंद्रों की मदद से वर्षा जल संग्रहण की देशज प्रौद्योगिकियां प्रस्तुत कीं। झारखंड के बरातपुर जिले के गांव गुनिया से इसकी पहल हुई। कृषि के द्वारा पहले तो 'बोरा बंदी तकनीक' प्रस्तुत की गई जिसमें ग्रामीणों को रेत के थैलों से बांध बनाना सिखाया गया और जल को रोका गया। साथ ही इस छोटे से क्षेत्र में दर्जन भर फार्म पॉन्ड यानी जल कुंड बनाए गए। साथ ही पुराने जल कुंड को नई तकनीक से रूप देकर उन्हें साफ-सुथरा किया गया और उनमें वर्षा जल एकत्र किया गया। इसके प्रभावी परिणाम सामने आए। ज्ञात हुआ कि मामूली प्रौद्योगिक परिवर्तन के करने से जल कुंडों की जल-धारण क्षमता में 60 प्रतिशत तक की बढ़ोत्तरी हुई और जलदास में 80 प्रतिशत कटौती हुई। रोचक बात यह रही कि इस वर्षा जल संग्रह का बतौर सिंचाई प्रयोग कर 10 हैक्टेयर क्षेत्र में धान की उपज ली जा सकी।

इसी श्रृंखला में झांसी जिले में पनपती 'डौमागौर पहुज जलसंभर

कृषि प्रौद्योगिकियां- नए क्षितिज की ओर & MWdnyli 'keZ

ekul wh cjl kr l sfeyk, gkfk

भले ही कृषि को मौसम का जुआ कहा जाता रहा हो मगर अब कम से कम भारत तो इससे उबर चुका है। अब गुजरे साल को ही लीजिए, गर्मी की तपिश को मिटाता दक्षिण-पश्चिमी मानसून समय पूर्व आया और जम कर आया। शहर वाले परेशान हुए मगर खेती को तोहफा मिला। जो कुएं सूखे पड़े थे वह भरे साथ ही, भूजल भी बढ़ा। इस दिशा में देश की कृषि संस्था भारतीय कृषि अनुसंधान परिषद् द्वारा कुओं की पूलिंग का अनोखा मॉडल तैयार कर दिखाया। आंध्र प्रदेश के रंगारेड्डी जिले में तैयार इस नवीन मॉडल में एक पाइप लाइन नेटवर्क तैयार किया गया। किसान ने इस साधारण मगर प्रभावी तकनीक को समझा और कुओं पूलिंग में आ जुड़े, इससे निजी स्तर पर कुओं की खुदाई रुक गई। ठीक इसी तरह नेशनल इनिशिएटिव ऑन क्लाइमेट रेजिलिएंट एग्रीकल्चर यानी 'निक्रा'

परियोजना उल्लेखनीय है। इसके अंतर्गत बड़े बांधों के चारों ओर बहुउद्देशीय वृक्ष प्रजातियों के 15,000 पौधों का वृक्षारोपण कर जल संरक्षण और मृदा संरक्षण प्रणाली विकसित की गई। इससे जल संग्रह तो हुआ ही सूखा प्रतिरोधकता भी बढ़ी। भारतीय कृषि अनुसंधान परिषद् द्वारा झांसी स्थित अपने संस्थान राष्ट्रीय कृषि वानिकी अनुसंधान केंद्र की सहायता से वर्षा जल संचयन की स्थानीय उपयोगी प्रौद्योगिकियों को उपयोग के लिए प्रचारित किया गया। इसके अंतर्गत सूखे या फिर गहराते नाले के पानी को भी संजोया गया। एक परीक्षण में पानी को संजो कर रखने के लिए आठ स्थानों पर चैक डैम तकनीक का प्रयोग किया गया। इसके अलावा, पुरानी जल भरण तकनीक में सुधार करते हुए 150 मिट्टी के गोल ढांचे बनाए गए। इसमें बिना गाद के वर्षा जल संग्रह हुआ। ग्रामीणों को यह सरल प्रौद्योगिकी काफी भायी है। एक अन्य तकनीक में तीन जल फैलाव बनाए गए जो पानी को बहाव देते हुए एकत्र करते हैं।

Ñf'k e' khuhj.k ea t Mku, v/; k

कृषि में कम समय में अधिक काम, श्रम की बचत, लागत घटाने जैसे मुद्दों का एक ही जवाब होता है और वह है मशीनीकरण। इनके प्रयोग से कृषि उत्पादन और उत्पादकता दोनों में बढ़ोत्तरी होती है। हाल ही में कृषि क्षेत्र में आए नए उपकरणों और मशीनों ने कृषि में नए अध्याय जोड़े हैं।

I; kt [kphZ; a- पहले चर्चा की जाए प्याज खुदाई यंत्र की। भोपाल स्थित केंद्रीय कृषि अभियांत्रिकी संस्थान द्वारा समय पर खुदाई को ध्यान में रखते हुए इस यंत्र का विकास किया गया है। ट्रैक्टर द्वारा संचालित इस प्रोटोटाइप यंत्र की खेत पर क्षमता 0.15 हैक्टेयर प्रति घंटा आंकी गई है। इसकी विशेषता यह है कि यह खुदाई यंत्र मजदूरों से खुदाई में होने वाले व्यय की अपेक्षा 50 प्रतिशत कम खर्चीला है। इसी प्रकार उठी हुई क्यारियों में प्याज की बुआई के लिए एक बीज एवं उर्वरक ड्रिल का विकास किया गया है। यह सात पंक्तियों वाली मशीन है। इसकी बीज बुआई क्षमता 0.5 हैक्टेयर प्रति घंटा है जिसे यह अधिकतम 5 किलोमीटर प्रति घंटा की गति से पूरा करती है।

dVb&NvBZfi d ikt h'kuj ऊंचे वृक्षों में कटाई-छंटाई और फल तुड़ाई श्रम साध्य और जोखिम भरा काम है। इसी बात को ध्यान में रखते हुए भारतीय कृषि अनुसंधान परिषद् द्वारा एक ट्रैक्टर माउंटेड पिक पोजिशनर यंत्र का विकास किया गया है। यह दक्ष एक मीटर ऊंचे वृक्षों को अपने कार्य क्षेत्र में सहजता से ले लेता है। असल में एक ट्रैक्टर के ऊपर एक गतिशील प्लेटफार्म लगाया गया है जो तीन टुकड़ों में बंटा हुआ है। लौह धातु से निर्मित इस इकाई में एक डबल एक्शन हाइड्रोलिक सिलिंडर लगा हुआ है जो जल दबाव सिद्धांत पर काम करता है। इसकी सहायता से ही दस मीटर की ऊंचाई तक पहुंचा जा सकता है। यंत्र के शीर्ष भाग में जो कि चौड़ाई लिए है, इतनी जगह है कि कोई व्यक्ति काफी आराम से खड़ा होकर तुड़ाई, कटाई-छंटाई सहज ही कर सकता है। ज्ञात हो कि यह प्लेटफार्म केवल सीधी समतल में ही गति करता है जबकि क्षैतिज गति ट्रैक्टर की स्थिति निर्धारित करके बनाई जाती है। इसका परिचालन दो व्यक्तियों द्वारा होता है एक ट्रैक्टर चलाता है तथा दूसरा शीर्ष पर चढ़ कर कार्य को अंजाम देता है। इस संपूर्ण इकाई का भार 500 किलोग्राम है। मूलतः इसका निर्माण आंवला के लंबे वृक्षों से फल तुड़ाई के लिए किया गया है। इसी आधार पर प्राप्त मूल्यांकन से ज्ञात होता है कि इसके द्वारा एक व्यक्ति एक घंटे में



लगभग 150 किलोग्राम तक फल तोड़ सकता है। इकाई को 40 किलो वॉट के ट्रैक्टर से परिचालित किया जाता है।

इसी प्रकार का एक स्वचालित हाइड्रोलिक प्लेटफार्म भी तैयार किया गया है। मूलतः आम, संतरा तेलताड़ आदि की तुड़ाई के लिए विकसित की गई यह प्रणाली सेल्फ-प्रोपेल्ड प्लेटफार्म है यानी स्वचालित है। इसमें ट्रैक्टर का प्रयोग नहीं किया गया है। इसमें 8.2 किलो वॉट का पेट्रोल इंजन है जो 360 डिग्री तक कार्य करने की क्षमता रखता है। यहीं नहीं इसमें हाथ से नियंत्रित करने की भी क्षमता है। इसका परिचालन विभिन्न ऊंचाइयों से संभव है। परीक्षणों में इसका परिचालन एक मीटर से छह मीटर तक की ऊंचाई पर सहजता से देखा गया है। ईंधन की खपत की बात की जाए तो इस इकाई में ईंधन की खपत दो लीटर प्रति घंटा पाई गई है।

i vktj {k- dsfy, l rjk rVbZ; a- बागवानी की दृष्टि से देश का पूर्वोत्तर क्षेत्र विकास की ओर अग्रसित है। इसी आवश्यकता को देखते हुए एक हस्तचलित संतरा तुड़ाई उपकरण विकसित किया गया है। यह एक सरल, सहज मगर प्रभावी युक्ति है। इसमें मूल उपकरण 335 सेंटीमीटर लंबा बांस का डंडा है जिसके शीर्ष पर एक कटर लगा हुआ है। इसी कटर के संचालन से तुड़ाई होती है। कटर को रस्सी और क्लच जैसी व्यवस्था से परिचालित किया जाता है। इस डंडे के आगे की ओर एक हल्की टोकरी लगी होती है जिसमें टूटते हुए संतरे तत्काल गिरते जाते हैं। इसके अलावा, इससे जुड़ा थैलेनुमा कपड़ा भी होता है जिसके माध्यम से फल बार-बार नीचे



जमीन तक बिना क्षति के पहुंच जाते हैं। पूरी इकाई का भार मात्र दो किलोग्राम है। इसके मूल्यांकन से ज्ञात हुआ है कि इसके द्वारा 425 फल प्रति घंटे तोड़े जा सकते हैं।

l q kjh vkoj .k gVkus ds fy, ; æ % सुपारी प्राप्त करने में उसका आवरण यानी ऊपरी कवच हटाना एक समस्या है। इसके लिए मजदूरी पर खासा खर्चा करना होता है। इस दृष्टि से उत्पादकता बढ़ाते हुए और खर्चा घटाते हुए कामगारों के परिश्रम को कम करने और सुरक्षा देते हुए सुपारी आवरण हटाने का यंत्र विकसित किया गया है। इसमें मूलतः घूमते हुए सिलिंडर है जिन पर खूंटियां लगी हुई हैं। जिनके बल के प्रभाव से ही गुच्छों से सुपारी अलग हो जाती है। इसी के साथ दोलायमान सुपारी आधार में लगी छलनी पर गिरती जाती है। इसके गिरने के साथ ही भूसी और अन्य अशुद्धियां सुपारी से अलग हो जाती हैं।

/ku l sploy fudkyusdhe'ku % धान से चावल निकालना बड़ी मेहनत का काम होता है। इसी सोच के साथ धान से चावल प्राप्त करने की शक्ति चालित मशीन तैयार की गई है। इसकी मुख्य काया धातु की है जबकि इसके आगे दो बड़े रबड़ रोल लगे हुए हैं। इन्हीं की सहायता से धान का छिलका अलग किया जाता है। मशीन में एक पंखा भी लगा हुआ है जो धान के छिलके को बाहर उड़ा देता है। परीक्षण बताते हैं कि इस मशीन के प्रयोग से एक तो बिना पॉलिश का चावल प्राप्त होता है दूसरे चावल टूटते नहीं हैं और उनकी पोषकता बरकरार रहती है। मशीन की कार्यक्षमता 40 किलोग्राम प्रति घंटा आंकी गई है। डेढ़ से दो अश्व शक्ति की विद्युत

मोटर वाली इस मशीन का भार मात्र 50 किलोग्राम है। इस मशीन को छोटे और सीमांत किसानों के लिए विशेष तौर पर उपयुक्त पाया गया है।

ukfj; y j'sk vyx djus dh e'ku % नारियल फल का ऊपर का भाग जो रेशों से युक्त होता है, अब व्यावसायिक स्तर पर प्रयोग किया जाने लगा है। इन रेशों को बहुत ही परिष्कृत रूप में प्रस्तुत करने के लिए अब एक मशीन विकसित की गई है। इसकी विशेषता यह है कि यह नारियल के रेशों को विभिन्न ग्रेड में ग्रेडिंग की क्षमता रखती है। ज्ञात हो कि इन विभिन्न गुणवत्ता वाले ग्रेड को उत्पाद की आवश्यकता के अनुरूप चयन कर उपयोग में लाया जाता है। लौह धातु से निर्मित यह मशीन वायु को खींचने और गुरुत्वाकर्षण के सिद्धांत पर कार्य करती है। मोटे तौर पर इसमें एक ताप कक्ष यानी चैंबर और उससे सटा रोलर होता है। यह रोलर ही है जो पहले तीव्र गति से घूमते हुए नारियल के रेशों को खोलता है और फिर अपने घूर्णन बल से ही उन्हें चैंबर में धकिया देता है। चैंबर से घूमती पट्टियां यानी कन्वेयर बेल्ट जुड़ी होती हैं जो हल्के रेशों को आगे ले जाती हैं और भारी रेशे चैंबर में ही छूट जाते हैं। बाद में हल्के रेशे परिष्कृत हो कर विभिन्न प्रयोगों में लाए जाते हैं। यह एक प्रभावी यंत्र है जिसकी क्षमता 50-60 किलोग्राम परिष्कृत रेशा प्रति घंटा आंकी गई है।

okW&bu Vuy % बेमौसमी सब्जियों के लिए सर्दियों के मौसम में गर्मियों का पूरा ताप पैदा कर बेमौसमी सब्जियां उगा लेना उपभोक्ता और उत्पादक दोनों के लिए लाभ का सौदा है। संरक्षित खेती के अंतर्गत भारतीय कृषि अनुसंधान संस्थान, नई दिल्ली के कृषि वैज्ञानिकों द्वारा एक सरल, सस्ती और प्रभावी रचना तैयार की गई है जिसमें किसान स्वयं चयन कर पौधों की देखभाल कर सकता है और बाहर के कम ताप की दशाओं में भी बेमौसमी सब्जियां उगा सकता है। तैयार की गई संरचना एक पारदर्शी टनल का रूप लिए हुए है जिसके अंदर क्यारियां ठीक वैसे ही तैयार की जाती हैं जैसे छोटे खेत में होती हैं। प्रारंभ में तैयार की गई यह रचना 25 x 4 मीटर यानी 100 वर्ग मीटर आकार की है। लकड़ी और लोहे के सरियों से इसे आयताकार टनल का आकार दिया जाता है जिस पर पारदर्शी प्लास्टिक की मदद से एक अस्थायी संरक्षित संरचना तैयार की जाती है। इसकी ऊंचाई बीच से 1.8 मीटर है, चौड़ाई 4 मीटर और लंबाई 25 मीटर रखी गई है। चारों ओर से बंद इस रचना में विभिन्न कार्य करने के लिए एक द्वार भी लगाया गया है। एक

अनुमान के आधार पर इस प्रकार की संरचना को लगभग 13,000 रु. में तैयार किया जा सकता है। इस संरचना को अस्थाई तौर पर दिसम्बर से फरवरी माह तक रखा जा सकता है। उसके बाद इसे हटा कर सुरक्षित रख दिया जाए तो यह अगले वर्ष काम आ जाएगी। इस प्रकार की संरचना में सर्दी के मौसम में फ्रेंचबीन, टमाटर, लौकी आदि सब्जियां उगाई जा सकती है।

dlw l sefDr fnykrkuV gkml %कम लागत में प्रभावी नेट हाउस छोटे और सीमांत किसानों के लिए एक आवश्यक प्रौद्योगिकी बन सकती है। वर्षा के मौसम में खुले वातावरण में सब्जियों का उगाया जाना कीटों को सीधा न्यौता देना है। वहीं 40 से 45 डिग्री सेल्सियस तापमान में भी यह नेट 50 प्रतिशत तक छाया प्रदान कर सब्जियां उगाने की परिस्थितियां बनाता है। इसी प्रकार अत्याधिक सर्दी में भी इस नेट की मदद से सब्जियां उगाना संभव है। आयताकार रूप लिए इस नेट का आकार 12.5 x 4 मीटर यानी 50 वर्ग मीटर है। इसकी ऊंचाई 1.8 मीटर रखी गई है वहीं इसमें 1.6 x 1 मीटर का प्रवेश द्वार भी है। इसे एक सामान्य कारीगर की मदद से किसान भाई स्वयं भी तैयार कर सकते हैं। बतौर सामग्री जंगरोधी पाइप, कीट अवरोधी नेट, काले या हरे रंग का छाया करने वाला नेट, पारदर्शी प्लास्टिक, द्रव सामग्री आदि की मदद से इसे तैयार किया जा सकता है। परीक्षणों में पाया गया है कि एक बार तैयार की गई आकृति दस वर्ष तक सहज कार्य करती है।

l k lchu xglbZmi dj. k %आज देश में सोयाबीन की खपत तेजी से बढ़ रही है जो न केवल सीधे खाने के रूप में है बल्कि इसके विभिन्न उत्पाद भी तैयार किए जा रहे हैं। सोयाबीन गहाई आमतौर पर हाथ से ही की जाती है। मगर अब एक सस्ता उपकरण विकसित कर लिया गया है। जो शोध कार्यों के लिए तो उपयोगी है ही घरेलू स्तर पर भी प्रयोग किया जा सकता है। भारतीय कृषि अनुसंधान संस्थान के कटाई उपरांत प्रौद्योगिकी संभाग के वैज्ञानिकों ने आम मिक्सर-ग्राइंडर को रूपांतरित कर उसमें गहाई के लिए उपयोगी प्लेट लगाई है जो मूल मिक्सर द्वारा ही कार्य करती है। यह प्लेट

101 मिलिमीटर व्यास की है और उसकी मोटाई दो मिलिमीटर है। इस प्लेट के ऊपरी भाग पर 50 मिलिमीटर लंबी और 4.55 मिलिमीटर व्यास का एक बोल्ट फिक्स किया गया है। बोल्ट को पीवीसी की एक मजबूत मगर चिकनी ट्यूब से ढका गया है ताकि मशीन के काम करते समय सोयाबीन का दाना क्षतिग्रस्त न हो। परीक्षण में पाया गया कि हालांकि प्लेट की घूमने की गति गहाई को प्रभावित कर सकती थी जो मूलतः अधिक होती है, अतः इसे 10,000 चक्र प्रति मिनट की अधिकतम गति पर नियमित किया गया। यह परिवर्तित मशीन सोयाबीन उत्पाद बनाने वालों के बीच विशेष तौर पर लोकप्रिय हो रही है।



vle l s xByh fudkyrk

; a % आम के उत्पाद तैयार करने वालों के लिए एक प्रभावी यंत्र विकसित किया गया है। मूलतः लौह धातु से तैयार इस यंत्र में लोहे के एक शॉपट के ऊपर बड़ी संख्या में लकड़ी के रीपर तथा लाइलोन के ब्रश लगाए गए हैं। यह पूरा अंश एक 12 मिलिमीटर व्यास के छेद वाली छलनी के अंदर फिट है। विशेष पद्धति द्वारा इसके अंदर पानी के छिड़काव की व्यवस्था

की गई है। इस तरह से संचालित होने पर यह मशीन क्रमबद्ध तरीके से एक-एक आम से गूदा अलग करते हुए पूरी तरह से साफ गुठली को एक ओर निकाल देती है, तो वहीं मूल पात्र में आम का गूदा रह जाता है। परीक्षण के तौर पर आम की किस्म तोतापरी को चुना गया और पाया गया कि इसके साथ गूदा की मात्रा एवं गूदा निकालने की कुशलता क्रमशः 75 एवं 96 प्रतिशत रही। ज्ञात हो कि यह मात्रा हाथ से गूदा निकालने की अपेक्षा 20 प्रतिशत अधिक थी।

jk l bZ vS fNMelo l kfk l kfk djrk ; a % रोपाई से पनपने वाली फसलों के लिए भारतीय कृषि अनुसंधान परिषद् द्वारा एक ऐसा यंत्र विकसित किया गया है जो रोपाई तो सहज और कम समय में क्रमबद्ध करता ही है साथ ही शाकनाशियों (हार्बिसाइड) का छिड़काव भी करता जाता है। मूलतः शून्य और कम कर्षण वाली खेती के लिए प्रयुक्त यह यंत्र पूरी तरह से धातु निर्मित है और

ट्रैक्टर के साथ संचालित होता है। आयताकार रूप लिए इस यंत्र के आधार पर चार पहिए लगे हुए हैं। इसे स्प्रिंग से समायोजित होने वाली टांगों पर संचालित किया जाता है। चूंकि यह बीज की बुआई के लिए प्रयुक्त किया जाता है, अतः इसमें बीज और दवाई डालने के लिए अलग-अलग मीटरिंग बॉक्स लगे हुए हैं। स्पष्ट है कि इस मदद से कार्य एक साथ संपन्न होते हैं। वहीं तीसरा कार्य शाकनाशी के छिड़काव का है। इसके लिए रोपण यंत्र के पीछे नोजल लगे हुए हैं जिनके द्वारा छिड़काव किया जाता है। इसके संचालन के लिए पंप है जो कि नीचे रखी विद्युत मोटर द्वारा गति करता है।

igkMh p<us okyk VDVj MNV IyWj % ऊंचे-नीचे ढाल लिए पहाड़ी खेतों पर भी ट्रैक्टर द्वारा बीज रोपण करने का रास्ता ढूँढ़ लिया गया है। इसके लिए एक विशेष बीज बुआई यंत्र यानी ड्रॉप प्लांटर विकसित किया गया है। ट्रैक्टर चालित इस बीज रोपक में विभिन्न फसलों के बीज स्वरूप को देखते हुए कप फीड मीटरिंग लगाई गई है, जो बीज को ग्रहण करती है। इससे जुड़ा हिल ड्रॉप प्लांटर लगा है जो पहाड़ी अंतर को समायोजित किया जाता है और बीज का रोपण होता है। पूरी क्रिया पहाड़ी खेतों पर निर्धारित स्थान पर बीज गिराता है। बीज डालने की गहराई को विभिन्न फसलों की जरूरत के हिसाब से 25 से 60 मिलीमीटर के मध्य समायोजित किया जाता है। इसके बाद पहिए के अंत में खूंटियों की संख्या को बदलते हुए पहाड़ी दर पहाड़ी खेती पर चढ़ सकने वाले छोटे ट्रैक्टर से की जाती है। परीक्षण के तौर पर इस मशीन से मक्का और मूंगफली की बुआई की जा चुकी है।



Ql yladhcykZdsfy, NkSifg, okyk VDVj % पहाड़ी क्षेत्रों, छोटे, और कम चौड़ाई वाले खेतों पर बुआई की क्रिया संपन्न करने के लिए छोटे पहिए का ट्रैक्टर विकसित किया गया है। छोटे टायरों को 32 अश्व शक्ति वाले सामान्य ट्रैक्टर में लगाया गया है। ये छोटे टायर 6.2 X 32 पीआर आकार के हैं। जमीन से इसकी ऊंचाई 300 से 500 मिलीमीटर तक आंकी गई है। इसका प्रयोग सोयाबीन-गेहूँ और मटर-फ्रेंचबीन के लिए बतौर परीक्षण किया जा चुका है। परीक्षणों में यह भी पाया गया है कि पतला पहिया, बुआई, रासायनिक छिड़काव, फसल कटाई आदि कार्यों के लिए भी मददगार

है। ट्रैक्टर को विभिन्न गति से प्रयोग कर प्रति घंटे 0.2 से लेकर 1.7 हैक्टेयर तक खेत में प्रयोग में लाया जा सकता है।

i kWyFlu VV eal gfr f'keykfez% पहाड़ी क्षेत्रों से आती शिमला मिर्च दुलाई से पहले सुरक्षित रखी जानी आवश्यक होती है। इस दृष्टि से कृषि वैज्ञानिकों द्वारा सामान्य पॉलिथीन से तैयार एक टेंट विकसित किया गया है। ठीक टनल का रूप लिए इस टेंट में आवागमन के लिए एक द्वार है। परीक्षणों से ज्ञात हुआ है कि इस दशा में 25 से 30 डिग्री सेल्सियस तक के तापमान और 40-42 प्रतिशत आपेक्षिक आर्द्रता में भी तत्काल तोड़ी गई शिमला मिर्च को उसकी दृढ़ता के साथ बिना सिकुड़ने के एक सप्ताह तक सहज भंडारित किया जा सकता है।

igkMh {k-ladsfy, 'kx d'kzk fMy % पहाड़ी क्षेत्रों के छोटे खेतों को ध्यान में रखते हुए एक पॉवर टिलर चालित शून्य कर्षण ड्रिल तैयार किया गया है। चौधरी सरवन कुमार कृषि विश्वविद्यालय, पालमपुर में परीक्षण के दौरान धातु के बने इस ड्रिल को काफी प्रभावी पाया गया है। दो पहियों पर सहज संचालित और छोटे स्थान पर भी गतिशील इस ड्रिल में पंक्ति निर्माण के लिए चार फाल हैं। इसके ऊपरी भाग में बीज संग्रह के लिए छह खानों का एक बक्सा है। विशेष संयोजन के साथ बीज नीचे गिराने का प्रावधान है। परीक्षणों में इस छोटे उपकरण की कार्यक्षमता पहाड़ी क्षेत्रों में 2.1 से 2.2 किलोमीटर प्रति घंटा की अग्रसर गति पर 0.09 से 0.10 हैक्टेयर प्रति घंटा पाई गई है। वहीं यह भी पाया गया है कि इस ड्रिल की संचालन लागत परंपरागत माध्यमों की अपेक्षा 60 प्रतिशत कम है।

fct yh pkfyr cP VSl j vS yoyj % पहाड़ों पर, खेतों की ढलान पर सहज संचालित होने वाला एक बैंच टेरेसर विकसित किया गया है जो कि खेत की मेढ़ और ढलान को समतल करने की क्षमता रखता है। पूरी तरह से ठोस और मजबूत लौह धातु का बना यह यंत्र पहाड़ी खेत की 2 से 5 मीटर की चौड़ाई के लिए उपयुक्त पाया गया है। बिजली से संचालित यह यंत्र छोटे ट्रैक्टर से जुड़ा है। मूल भाग में धातु की अर्द्ध चंद्राकार रचना है जो विद्युत

शक्ति से उठती-गिरती है। इसी आधार पर यह मिट्टी खोद कर उसे समतल करती है। परीक्षण में इसकी कार्यक्षमता 0.12 हैक्टेयर प्रति घंटा पाई गई है।

mUkj[k M ?kuRb i WYFku ykbu ds rkyk % उत्तराखण्ड में अतिवृष्टि को ध्यान में रखते हुए विशेष तालाबों का निर्माण किया गया है। यह तालाब जहां आकार में छोटे हैं वही उथले भी हैं। इनकी विशेषता यह है कि इनमें कम घनत्व वाली पॉलिथीन लाइन का प्रयोग किया गया है। परीक्षण के तौर पर अल्मोड़ा के भागरटोला और नैनीताल के दरीम गांव में 2417 घनमीटर क्षमता वाला जल स्रोत बनाया गया है। इसमें तालाब की क्षमता 289 घन मीटर तक है। इसका प्रयोग सब्जियों के उत्पादन के लिए किया गया और पाया गया कि उत्पादन में 14.7 से 27.8 प्रतिशत तक वृद्धि हुई।



i gMh {k-lcdsfy, mi ; lsh fx/ fQYVj % पहाड़ी क्षेत्रों में विकसित छोटे मत्स्य तालाबों में जल्द जमती काई मत्स्य पालकों के लिए समस्या बनी हुई है। इसके समाधान के लिए भारतीय कृषि अनुसंधान परिषद् के वैज्ञानिकों द्वारा ग्रिट फिल्टर नामक विशेष ताल-छन्नक विकसित किया गया है। मजबूत मगर लचीली प्लास्टिक द्वारा निर्मित इस फिल्टर का प्रयोग जल की सफाई और मछली के ताल से पोषक तत्वों की कम से कम निकासी के लिए कारगर है। साथ ही यह फिल्टर काई से होने वाले नुकसान को भी कम करता है। गर्मी के समय जब जल में ऑक्सीजन की कमी होती है तो यह फिल्टर 70 प्रतिशत अशुद्धियों को दूर करता है जिससे मछलियों की मृत्यु दर रुकती है। यही नहीं यह फिल्टर घुलनशील ऑक्सीजन को 1-1.5 पीपीएम तक बेहतर बनाता है।

eNyh l qkusdsfy, i WY gkml Mk j % पहाड़ी खेतों में छोटे आकार के पॉलि हाउस की बढ़ती हुई लोकप्रियता उनके विविध उपयोगों के कारण है। इसी श्रंखला में भारतीय कृषि अनुसंधान परिषद् के वैज्ञानिकों द्वारा सौर ऊर्जा से संचालित 'सोलर पाइप ड्रायर' विकसित किया गया है। यह एकल स्पैन आर्क यानी घेराव वाला है। यह लगभग ढाई मीटर ऊंचाई लिए है तो वहीं इसकी लंबाई 21.3 मीटर और चौड़ाई 4.6 मीटर है। इसमें विभिन्न स्थानों पर हवा के बहाव के लिए निकास बनाए गए हैं। परीक्षण में पाया गया है कि इस पद्धति से पॉलि हाउस के अंदर का तापमान बाहर

की अपेक्षा 5 से 15 डिग्री सेल्सियस तक अधिक हो जाता है। अधिकतम ताप 50 डिग्री सेल्सियस मापा गया इससे मछलियां सहज सूख जाती हैं और उन पर कीट-व्याधि भी नहीं पनपते हैं।

pk dh i fUk l ar kMus dk ; a % चाय के बागानों में पत्तियां तोड़ने का काम महिलाओं के ही जिम्मे है। यह बारीक काम है अतः श्रम साध्य भी है। इसी बात को ध्यान में रखते हुए कृषि वैज्ञानिकों द्वारा चाय पत्ती तोड़क यंत्र तैयार किया गया है। धातु का बना कैंची के आकार का यंत्र न केवल अधिक मात्रा में चाय पत्तियां तोड़ने में सक्षम है बल्कि महिलाओं के लिए सुरक्षित भी है। इस उपकरण में हल्के भार वाली ट्रे भी जुड़ी होती है जो पत्तियों को एकत्र करती है। यह यंत्र एक सरल संरचना लिए हुए है जिसमें नाइलॉन की जाली, हल्की स्टील के बने हुए दो ब्लेड और नाइलॉन की हैंडल ग्रिप यानी हत्था होता है। इस मशीन द्वारा 8.6 किलोग्राम प्रति घंटे की रफ्तार से पत्तियां तोड़ी जा सकती हैं। परीक्षण बताते हैं कि इस मशीन से मेहनत कम लगती है, उंगलियां घायल नहीं होती तो वहीं यह उतने ही समय में 40 प्रतिशत अधिक पत्तियां तोड़ने में सक्षम है। मशीन का कुल भार मात्र 800 ग्राम है। महिलाएं इसे सहज उठा कर ले जा सकती हैं।

स्रोत : आविष्कार-मार्च, 2014