

Evolve Maritime Training Institutes - MTIs into “Smart Campus” for training mariners

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Abstract :

This paper explains on evolving a campus at a Maritime Training Institute – MTI as a “Smart Campus”. The implementation process starts with the Institute carrying out an Audit of Green Assets and taking an account of the principal elements constituting the natural resources. All principal elements are assessed and subjected to remediation and new practices are added as planned. In this process the MTI transforms into a Smart Campus. This evolution at the MTI is progressed with improvements year by year and the mariners being trained in pre-sea and post-sea courses, too become environmentally conscious and competent, inclusive of the faculty providing the training.

KEYWORDS: Maritime ; training; smart campus; environment; natural resources; green-audit.

INTRODUCTION – “SMART CAMPUS” :

In India there is a wave that all cities are aspiring to become Smart Cities. Indian Government is also promoting all newer and selected old cities to aspire to be a “Smart City”. Financially also grants are being offered to states for development of these cities. On the ground it is seen to be more beneficial and needed as the natural resources are conserved in each of the city. Sustainable initiatives are promoted and efforts are afforded in order that natural resources are conserved. Also better energy distribution, communication mechanism and roadways are propagated in all the Smart Cities. All these would go a long way, in providing better quality of living for citizens living in cities.

Striking a similarity of individual cities with Institutes, we can gather that all the Institute campuses are also separate entities and are duly maintained for providing services to the community. Academic Institutions deal directly with the public and deliver the services of providing education and professional training to students etc. While the Institutions have the moral obligation to impart education, they also groom the members of the community and inculcate good culture and custom for better jobs for employment, upgrade living standards.

Most campuses used for maritime training of mariners are built and equipped to comply with mercantile-marine, governmental and IMO regulations . Be it be pre-sea or post sea, the main aim is to provide the requisite training as per curriculum with the use of marine- infrastructure and competent maritime training personnel. In this process requisite maritime training is imparted, and mariners are trained. Also they are certified competent to perform the maritime duties on board ships.

In this process of training, it is observed that at each of campuses of the Maritime Training Institutes- MTIs, residential and training facilities are provided which utilizes natural resources viz. water, energy and other environmental assets.

Therefore it is prudent that at each MTI pertinent efforts are afforded towards maintaining the natural resources and reduce any detrimental effects on environment due to the activities carried out at the campuses causing the environmental pollution and impacts.

Wastes both liquid and solid are generated in the campuses. Liquid wastes are in the form of different paths of waste-water from various uses. The solid wastes are of bio and non-bio origin. All these wastes if not remedied, would cause environmental pollution and affect the quality of living at the campus. Also then, considerable deterioration of environmental assets are experienced and this will lead to increase in training inputs and costs. Therefore it is planned that an assessment of natural resources by doing a Green Audit of environmental assets is carried out and stock of the existing natural resources are collated.

Upon carrying out a Green Audit, a clear concept would emerge to make aware the Management of the Institute, as to how the Institute campus utilizes the natural resources, where and how the pollution effects need to be addressed and what cost saving practices could be employed for optimizing the operating costs and expenses. The remedial-efforts that are needed to be done are planned and carried out with capacity available in house- faculty and the trainees.



A pictorial view of a MTI- Maritime Training Institute (Picture used for representation only)

In doing the above, the campus evolves itself into a Smart Campus in becoming an ideal Institute for imparting Maritime training for Seafarers. This objective is also in line with the Indian Governmental directives desiring all Institutes to conserve natural resources and reduce impacts due to Environmental pollution and optimize the overall expenditure. It would be in order to have all academic institutions to aspire and become “Smart Campus” by exerting efforts for conserving usage of natural resources viz. water, wastes, electric- power for energy usage etc. The expenses and efforts which are afforded for carrying out the training the mariners at campus are saved and economized.

When these appropriate practices are being carried out at the campus, it is also experienced that there is more availability of resources at lesser costs and expenses. A–feel good factor is felt and the inmates at the campus become more confident and are self- reliant. Even in worst times when the complete region is feeling the shortages of water resources or energy needs, or campus appearing warmer, the campus will easily tide over the situation. The quality of living for the mariners is maintained at level more than good and enjoyable . The Institute stands to gain by getting a good reputation and the trainees too feel distinctly content in the trainings imparted. Thus in maintaining the training standards, the training is imparted to the trainees at all levels and disciplines as guided by IMO rules and regulations, and in complying with the Marine Administrations directives.

EFFECT OF ENVIRONMENTAL IMPACTS AT CAMPUS :

All institutional campuses are environmental impacts prone with adverse effects experienced by shortages of natural resources viz. water, energy and effects of greens, trees and plants etc. The effects of wastes generated at each campuses also are detrimental. Wastes are generated at the campus are in three forms- solid, liquid and gases. Solid wastes are of two forms- bio, non bio- origin, others which are to be dealt with safely including sanitary wastes etc. Liquid wastes arise from waste waters from hostels- toilets, baths, kitchen and others. Certain labs and work-shops also release waste-water which are duly to be taken care off. Gaseous wastes come from gen-sets, kitchen-exhaust and others. Even problems exist at campus due to heat islands and hot-spots present. All these remain unaddressed if they are left un noticed and not audited or taken note off.

All these wastes cause ill effects and detrimental environmental impacts. These pollutants are duly assessed and taken stock off. A systematic procedure is resorted to by doing - data sourcing vis a vis the conservational and environmental remedial actions which could be afforded. Sustainable initiatives are promoted and efforts are afforded in order that natural resources are conserved and wastes where possible are transformed and reused at the campus itself. While the above is being carried out, ill-effects of environmental impacts are remedied and campus is up graded.

Efforts are afforded for conserving energy, water resources and creating green projects in conserving and turning wastes into resources. These efforts would go a long way, in providing better quality of teaching/ learning experiences for staff, faculty, students and trainees. All the spaces are duly kept note off in way of the pollution effects caused in the progress of the training. Due to the wastes generated, viz. Solid wastes, liquid wastes and gaseous wastes due to exhaust from gen-sets, fumes from kitchen-exhausts and certain devices at the Ship-in Campus used for training purposes. Even to the extent if the off- campus drive-ways are nearby, the cities traffic is considered as a polluter and a cordon of tree-lines are planned for absorbing the effects and smothering the same.

Water resources required for the campus is usually drawn from aquifers on ground, and this results in considerable impact on the green- cover present at the campus. If this ground water is deficient then the campus seeks water ex-campus using water-tankers or piped supply from city's water-supply lines. These result in considerable environmental impacts.

During rains, it may be probable if the storm water is not duly channelled could lead to water logging at shallow spaces at the leading to inundation and bad effects. The situation becomes more grave if rain water and waste- water from up-stream of the campus due to the terrestrial gradient flows into the campus and results into consequential problems.

The campus seeks Electricity Supplies for its sustenance from Municipal/ City's supply board, and in the event of power-shortage self-generates power at the campus by its captive gen-sets. These power generation devices viz. diesel engines are duly maintained and pollution effects are kept as minimum as possible. Power generation using renewable-energy sources viz. Solar , Bio-gas etc. are resorted to curtail environmental pollution effects.

The green-cover by way of trees and use of plants are optimised and duly maintained. All the path ways, lanes and roads if barren do not provide shade zones and resulting in heat-islands with adverse effects. Certain spaces having tendency of becoming barren results in creating heat or cold waves with campus- dust. When more barren roof-tops and terraces are present, all these result in creating extreme heat condition in the upper-floor rooms in the both the academic blocks and hostel accommodation. If their maintained moderate it improves the living condition and with more comfort.

Off- campus activities by communities in the outer peripheries surrounding the campus are also kept noted and duly smothered to reduce the pollution effects to the said campus. All the associated environmental, social effects affecting the institute are also smothered in the most natural mode. While conducting the Green Audit all these detrimental effects of pollution and resulting impacts are duly computed and progressed with remedial and corrective actions.

APT INITIATIVES PLANNED BEFORE EFFECTS ARE FELT UPON GREEN AUDIT :

One by one Environment conscious Institutes, are exerting efforts to become more conservative on energy, water consumption and wastes optimization . Environment friendly measures are practiced so that pollution effects are reduced in the respective sites. Implementing green initiatives enhances the sustainability level of each of the institution. And regular Sustainability Audits are carried out with targeted improvements done year after year.

Green Audit is planned and done periodically and regular assessment of environmental pollution and the remedial process of conservation and up-gradation of environmental elements is initiated. The evolution of a Smart Campus at the Institute happens, due to the Owners and Management of the Institute exercising due diligence in way of the effects on environment and overall on the society.

Green Audit at a Smart Campus is a collection of assessed data and doing bio-remediation of natural resources on the 6 Nos. principal elements as detailed below:-

1. Water resources: viz. ground water- from aquifers, piped- municipal supply , tanker water. Rain water from upstream and at campus and flowing down stream, Rain water harvesting (RWH) , creation of re-use water from waste water ex. sewage, sullage, kitchen, others are done. All remedied water is re-used and if in excess is contained in water-bodies and its assets audited, improved year after year.
2. Solid Waste- Bio wastes segregated composted to manure, used for greens. Non bio- wastes are recycled. Toxic and hazardous safely disposed off campus. Gaseous wastes – Engine exhaust, fumes assessed, audited and bio-remedied.
3. Greens- peripherals on borders with trees, shrubs. Spaces with lawns, planters - big, medium and small, ornamental, terrace gardens etc. Facility for nursery & gardeners. Horticulture concepts, detailing on landscaping, aesthetic appeals, done.
Quantity of trees and quality of flora/ fauna- birds, reptiles, and others..
4. Energy Audit - Electricity Supplies from EB, Captive DG sets, others generating renewable energy- energy audits, required conservancy measures, optimization done.
5. Heat Islands - Assess and reduce heat island effect at varied locations viz. having soft – paving on ground, lighter colors on roofs & walls. Optimize Air Conditioning, enhance thermal comfort and campus micro-climate . Also create vent- tunnel drafts in spaces to reduce power bills
6. Environmental and Community Assets Conduct of religious festivals, functions tolerant to environment are planned and maintained on campus grounds.

Functioning of educational institutes are designed for total deliverables to the society for imparting education and realization of values to students. Institutes also conduct value added environmental training for all faculty and students to bring value in the communities. All these initiatives are taken forward on a set pattern and overall green principles are evolved at each sections of the campus. Do-able initiatives are listed and budget is made for formal approval.

A team of Project planners are evolved for training students, others under guidance from professionals, senior faculty with on-site project training. The Institute draws benefits from same. In next phases, these practices are perfected and better Campus Green Practices Manual is evolved.

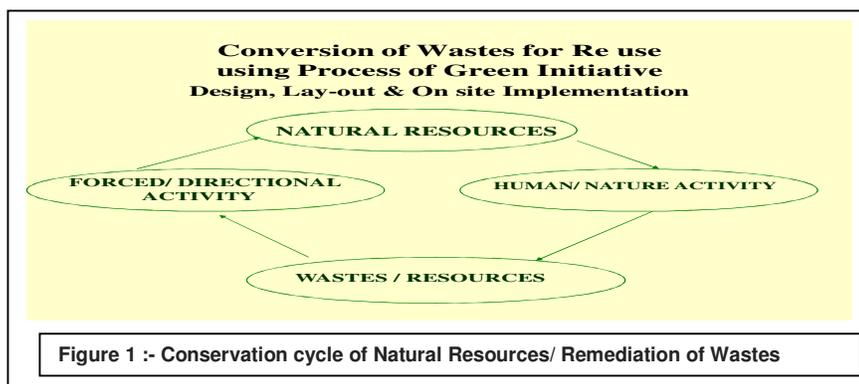
AIM FOR CONSERVATION OF NATURAL RESOURCES & REMEDIATION OF WASTES :

On the findings of the Green Audit on each of the elements, conservancy programs are initiated and remedial practices are followed.

It is generally seen that with project costing approximately 5 to 10% of annual budget, a lot could be gained by the Institute in time to come. The project- gains accrued are estimated to be twice the efforts and costs afforded. Actually the gains and benefits that are realised are approximately 15 to 20% of annual budget value of the projects.

Also in doing conservancy measures, the Institute stands to gain both directly and indirectly.

A process employing Conservation cycle is adopted for each of the 6 Nos. elements and the assets are upgraded using natural methods and bio- remediation principles and practices as detailed in Figure 1.



Each of the natural resource is upgraded by a For each of the natural element a basic upgradation process is utilised as explained in the Figure 1. Detailing the elements of Conservation cycle of Natural Resources/ Remediation of Wastes

Awareness and participation programs of students and faculty members associated with communities involvement are done. Specific initiatives at MTIs are planned and progressed for training deliverables. The main principle of – “**Conserve and Re-use**” is adopted and practised.

Amongst the natural elements, water, energy and greens are addressed with direct methods in way of carrying out conservational practices by opting for natural methods and planned activities. Water from rain is duly conserved above ground in ponds and if in excess is harvested by taking it to below-ground aquifers. Greens- trees and plants, are created at zones to provide apt benefits in the campus. Renewable energy devices are used to provide for energy needs thus conserving electrical power.

The other method used in the campus is to carry out remediation of wastes in creation of resources. The recycled resources evolved from once used resources in way of remedied waste-water is used for secondary uses in the campus for irrigation of greens and other uses. Even sludge from sewage waste is converted to manure using a process of co-composting at campus. In the composting process all bio-wastes eg tree litter, dried flowers, and kitchen wastes are duly processed. In this natural process manure is evolved and used as nutrient for campus greens droppings,

GREEN INITIATIVES EVOLVED FOR - “SMART CAMPUS” & ASSETS REALIZED :

The sustainable approach at each of the campus-sites is to carry out environmental practices on water, management of wastes, greening of campus, energy optimization and awareness building. Several mixes of environmental projects are executed and are duly maintained to get desired effects and their gains at the respective sites.

The details of the process utilized and implemented are given as in Figure 2.

Examples of Process for Conservation of Natural Resources & remediation of wastes:			
S.No.	Natural Resource	Green Initiative	Conserved Resource/ “Smart Campus”- Asset
Input		+	Process
		====	Output
1.	Rain/ storm water	RWH – Rain Water Harvesting	Recharge in well/ pond
2.	Waste water/ sewage	STP- Sewage Treatment Plant	Co-composting / Manure
3.	Waste water/ sullage	STP- Sewage Treatment Plant	Re-use water for Use
4.	Solid waste – bio origin	Composting & Soil Treatment	Co-composting process
5.	Solid waste – non-bio	Recyclers mode & safe -disposal	Revenue realized/ re-use
6.	Air Quality - CO2 / SPM	Campus greens & landscapes	Lawn/ green cover
7.	Festival - celebrations	Eco-conduct eg safe practices	Smart campus evolved
8.	Electricity supplied	Energy audit with conservation	Revenue saved
Heat Islands & others remedied /audited/ assets realized at SMART Campus.			
Figure 2 :- Details of Green Initiatives : Process and Smart Campus Assets - Audit Account			

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The campus initiatives are show cased for their own benefits and audited. A campus such as the one evolved for purpose of MTI, is to serve as a role model to others, thereby instructing students, faculty and campus staff .

Each of the campuses use a lot of natural resources viz. water, energy, greens and trees. The management and faculty at the MTI are trained to be more environmentally conscious. Trainees in every way aspire to conserve natural resources, and sustain the Green initiatives .

While existing projects are monitored and assessed, newer projects can be identified. An effective tool to do so and also involve stakeholders will be to prepare a sustainability plan for the campus and publish this via a sustainability report. World's most progressive organizations prepare a sustainability report which carries the organization's sustainability performance and score-card, this public commitment and disclosure builds momentum to scale up projects and demonstrate savings.

Thus after becoming confident of sustaining the efforts, the projects are expanded and newer ones are added to suit the varied needs of the Institution. This creation of green initiatives results in evolving of Smart- campus holistically at the Institution itself with desired tangible and intangible benefits.

As per the requirement of Marine Industry and Government of India's Shipping regulations, the initiatives are planned at the Institutes in compliant to the guidelines and training curriculum. Environmental projects are also done as per IMO's Guidelines and giving total awareness on all important Conventions and the associated Committees mainly MEPC - Marine Environmental Pollution Control Committee.

At the MTIs, awareness is also carried out on associated elements of MARPOL- Marine Pollution. Practical demos are duly exhibited where the campus working projects exist for the below mentioned ;

Marine Pollution as per details on Annexure I to VI with specific reference on sections as below.

- Annexure I - dealing with the aspects of oil usage and discharge of oil residues from users,
- Annexure IV - dealing with the aspects of sewage and campus waste water,
- Annexure V - pollution effects associated with Garbage having both bio and non-bio wastes
- Annexure VI - Air Pollution from devices at campus – DG Sets, energy efficiency measures

An Environmental Laboratory is kept functional on the duties as indicated for the intended objectives. The rules and guidelines as issued periodically by IMO is updated and maintained. All revisions and updates of IMO Notifications on pollution and its effects are displayed at each of the demo-projects.

IMO has associated with other UN Organisations to address relevant Sustainable Development-SDGs.

SDGs mainly dealt with models at the campus itself are as detailed below :

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities

SDG 6: Ensure availability and sustainable management of water and sanitation for all

SDG 7: Ensure Affordable clean Energy

SDG 8: Promote inclusive, sustainable economic growth, full, productive employment, decent work

SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable

SDG 12: Ensure sustainable consumption and production patterns with responsibilities

SDG 13: Ensure appropriate Climate Action.

SDG 14: Conserve, sustainably use the oceans, seas and marine resources for sustainable development

SDG 15: Conserve Life on Land,

SDG 16: Peaceful and inclusive societies for sustainable development, inclusive institutions

CONCLUSIONS AND WAY FORWARD :

Academic Institutions deal directly with the public and deliver the services of providing education and professional training to Mariners etc. While the Institutions have the moral obligation to impart education, they also groom the community and inculcate good culture and custom for better jobs for employment, upgrade living standards. It would be in order to have all academic institutions to aspire and become “Smart Campus” exerting efforts for conserving usage of natural resources viz. water, wastes, electric- power for energy usage. The expenses are economized and resources at lesser costs is created. More availability of resources is ensured and sustained at all times. One by one premier educational institutions are exerting efforts to become more conscious on energy and water consumption. Environment friendly measures are practised so that pollution effects are reduced in sites. This also enhances the sustainability level of each of the institution. Regular Sustainability Audits are carried out with targeted improvements year by year.

Functioning of MTIs are designed for total deliverables to the society for employment and realization of jobs among students. A few MTIs also conduct value added post- sea training for mariners serving in the Industry. Therefore it would be beneficial for MTIs to aspire to become- “ Smart Campus ”. This is easily accomplished with efforts made progressively year after year by periodical green audit and improvements done at the campus.

Instructions are afforded as per requirement on IMO’s Statutory rules, MEPC guidelines etc. As regards Energy Conservation, a full- fledged Energy Audit is carried out with awareness on Energy Efficiency Design Index-EEDI / Energy Efficiency Operational Index-EEOI and Ship Energy Efficient Management Plan-SEEMP followed for ships.

The Institute specially trains the trainees to be competent and fully aware in carrying out the responsibilities in executing the Sustainable Development Goals- SDGs . Specifically the objectives are kept note off and training is imparted to the trainees with the use of Instructional matter, placards, banners etc. Hands on training is also carried out to make the trainees fully competent to carry out the requisite role in achieving the target goals.

Instructions are duly followed and the Management particularly takes care of ensuring apt training. Creation of Smart Campus in an institution will be capital intensive. While executing the projects the inventory of resource-assets is enhanced. There is a wide scope for upgrading of technology of the project’s practices. There is a possibility of adaptable innovation being evolved. In the design, planning and implementation stages of Smart Campus, the practices are followed in order to nurture the tradition, culture and the learning that form the very basis of an institution.

In conclusion, a Smart Campus is evolved to sustain its green initiatives with progressive gains and benefits accrued on natural resources. Faculty, youngsters, students and support staff are evolved as a team to assist and plan out the specifics on the proposal done. Implementation is done on project mode with an aim of making a Smart Campus. The job specification is made with costing details and budget approval is sought and executed. An audit assessment of projects is done on the techno- economic basis wherein gains/ benefits are computed. All the projects are done on audit centric mode in a planned time frame . In the process of realizing the projects, communities aspire in realizing the common social and environmental good.

REFERENCES:

1. IMO - Rules and Regulations.
2. IMO and Sustainable Development Goals
3. MSC, MEPC – MARPOL Annexure
4. Green initiatives – www.griha.teri.org

PRACTICAL PROJECTS REFERED :

1. Green Initiatives at MTI- School of Maritime Studies, Vels University, Chennai