

## Lean Application to Farming - A success story by SMART Incubation

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### ABSTRACT

Farmers are no longer wanting their children to continue the farming. The unpredictable rains, hard work, fluctuation rate, and demand cycle delay are some of the major attributes. We through Smart Incubation centre started working towards this high-risk element and major social impact to find viable solution to minimise the risk and waste. The lean concept is used for waste identification and management. The concept got sponsored by VAMNICOM cooperative management training centre through Mr. Goel and Smart team led by Tissue culture and horticulture experts coming together with management wizards and Software programmers. A careful study of Abhinav cooperative of Hinjewadi farmers and interactions with farmers from Shivapur, Velhe, Satara, Kilhapur and Karad, resulted in a concept of Lean application to farming for improving their livelihood. This project is based on the hypothesis that micro planning and use of technology in farming impacts income of the members. The lean projects if taken up by proper mentoring has wide applications in farms as in industry. Methodology, thirty major waste were identified and solution is being developed for better economic returns for the farmers using the technology through our centre, we wish to share the success story in only area, the drinking water and water management application. Other projects shall be published as and when we get validated results. This is in continuation with our previous published papers Processing the waste to process waste and Voting logic as applied to Farms. The continuous interaction and year long monitoring and feedbacks from stake holders have proven and validated the hypothesis. We are sharing the same for peer review and similar applications in other fields.

**Key Words:** SMART incubation, lean, watermanagement, application, networking

### INTRODUCTION

The water from City with treatment is used in villages typically in Saswad, Velhe, and nearby. Most of the time due to not adequate treatment or mixing of impurities during storage was a issue. We through Smart incubation decided to take up this project to utilise the talent for water resource conservation and minimising the waste, thus improving the economic status of the farmers.

### INTRODUCTION TO INNOVATION HUB & SMART INCUBATION CENTRE

Free entries with reference were given to anyone who wanted to be part of the innovation and incubation. A dedicated gap analysis was done to map individual aspiration and current status review. The common topics for

development were identified, and specialised mentors and career development plans are also defined. The career counselling, training and mentoring are the three methods used for this transformation and the grooming is through SMART incubation and outcome has resulted in an innovation hub, a name of their choice.

## II.HYPOTHESIS

Application of Simple engineering application and Lean tools and techniques results in effective change management, and award-winning grooming of an individual or a team.

A dedicated model for incubation results in an Innovation hub that grooms the teams and develop projects impacting positively to change the society.

## III.METHODOLOGY

Data based on the surveys, interviews and finding of the selected pilot team of 5 farmers representatives from Shivapure, Hinjewadi, Velhe, Satara and Kolhapur and dedicated mentors in tissue culture and IT & lean experts form a team, that included ladies and gents from different social income and family and cultural background and also demographic area was selected who volunteered for this experiment, and were willing to undergo a change, by putting in efforts. This was initiated by allowing the leaders to choose the partners and team members, where in they can interact at least once a week and be monitored and mentored and trained.

Targets set for validations included - at list one validated waste management and lean application project done in this area. Pre-mentoring survey was done and evaluation is done, post mentoring same is repeated, also various interviews and observations are used other than the case results. To validate the change. The only restriction for topic for kaizen was to identify a problem that will have social application. A problem solving training and dedicated mentoring including counselling on positive thinking, lean management were the tools used for triggering the projects. The innovation and creativity modules are developed by experts in the field, but the application is monitored and mentored for SMART application – Socially motivated application of research and technology. Support from Engineering colleges and dedicated volunteers was also received. VIT, VAMNICOM and Sinhgad are the typical names. Industry teams included Mascot Pump, Mayura enterprises, Control touch, Intra Electronics, Wyse biometric system, Nehate electronics, and Nalco Champion.

## III.OBSERVATIONS & FINDINGS

Pre-mentoring analysis and finding of the team

Sr. No.	Point	Response from the team
1	Water use to smell sometimes- may lead to diseases	87%
2	No water during summer – issues related to water management & conservation	62%

3	No use of land after rice harvesting – underutilisation land	53%
4	No quick method for segregation and application available	89%
5	No method for utilisation of resources available	93%

**Table 1 – Pre-project situation**

After gap analysis of the situation following actions were initiated for selected members of team and individual and group interaction, counselling and mentoring plan as per the gap & need identified. Water treatment and MMI & IWRM was having and immediate application in this situation. The research students were involved and same was further developed using water potable analysis, machine learning and voting logic using a simple app and devise.

Training given to all farmers to use the gadget and segregation, storage, utilisation thus applying lean to the resources using AI and machine intelligence data developed over a year.

As the major tool is used based on data analysis for problem solving was based on machine logic.

The water grading and link to machine learning is as follows –

Water grading based on Litmus test, Photo detection, smell and colour check. If neutral then can be used for skin related application.

The test prompt is by machine, also if not neutral, the treatment prompt is also by machine. If not neutral the acid and/ alkali dozing is done. If having different colour and smell, microbial test is recommended to verify is the water suitable for agricultural application. If no, recommended membrane treatment is done depending on the impurity prompted by machine. The analysis and soil water test done once a year by elaborate instruments can be stored in machine and accordingly geo tagging can be done, so simple treatments for agricultural applications and recycle management can be done. Potable water is collected by water shed management and storage using the bamboo flex arrangement. A simple device which is low cost yet reliable application.

The at source analysis of impurity and actual daily quick check stored in machine facilitate to plot the trends and defines the treatment so using IOT and AI, machine learning and voting logic of annual analysis, quick checks and visual sensory analysis the water application is decided by the machine. So, the land remaining under utilised after rice harvesting got converted into watershed, driven fruit plantation area. Thus, the waste land, water was utilized by use of lean principals, IT and simple basic devices.

Details of the material used for machine treatment for water:

The simple filter of cotton, deposited with activated carbon, three cakes, and or combination that of with smart phone based prompt, using control and machine learning algorithm.

Two Matka (earthen pots for water cooling), or multiple of the sets depending on the profile, contaminants and machine prompt. One module has – set of two, with One of them with & one without tap, Water collection Pot,

for each grade cake to decide which or combination of either to be used based on contaminant to develop learning logic for the filter,

Test equipment, SMART phone, water application, contaminated source, CrCl<sub>2</sub>, Lead,

Details of assembly: The first pot was put on second pot. The junction was separated with filter, so the water dripping from the first pot gets treated by filtering and adsorption and pure cool water is available for drinking.

The carbon at lab was used effectively to get it tested a flask & titration tubes were used, however, to convert it into a gadget that can be used by all was a problem.

We brain stormed on it and realized a drop by drop arrangement is also possible if we use simple Mataka , the separation of the two with a filter would be easily done if we use the cotton filter with carbon deposit .

When a modular cost effective simple construction was done, The second problem was to identify and device a simple modular, cost effective, domestic application, or a gadget that can be easily constructed and validated.

The testing for NABL approved lab and availability for Lead AS analysis was a problem. But with help of our guide and support from VSI, and Vipanan extending the support we could get our gadget validated and calibrated for different grades and different applications, to develop basic software for profiling and machine learning.

Depending on contaminants the purity demand, all purifiers and voting logic can be used to achieve multi-level treatment till we get exact result depending on application. The water required for farming can have certain impurities typically domestic waste disposables are added in such water as fertilisers. So, such water graded for farming application if stored separately will help the farmers a lot. Similar to left over wastage of vegetables and related to farming and pre-processed waste can be used as manure. So, the waste identification, grading and application prompt to utilise otherwise waste water, allowing it to get contaminated with urban industry waste then treating it is avoided. Thus, we save the time efforts and ensure effective water management, by suitable grading application using simple machine logic and voting principle, to minimise instrumentation errors effects.

#### **IV. FIGURES AND TABLES**

Table showing the calculation of reduction after treatment, such reference are developed for various grade of treatment cakes, and contaminant to develop the machine learning using simple software program, based on daily logs.

Such analysis would also help for the municipal authority in long term to decide the control and identify the sources of contaminants to set effective water treatment.

**Table -The guidelines for drinking water**

Parameter	World Health Organization	European Union
Chromium	50µg/l	50 µg/l
Lead	50µg/l	10 µg/l
Nickel	50µg/l	20 µg/l

**Table 2 – Before and after results –**

	Conc. of Lead ion In ppm
BEFORE	8.207
AFTER	3.779
DIFFERENCE	4.428
% Reduction	$4.428/8.207 \times 100 = 54\%$
Result	54%



**Fig. The time response**



Fig. The adsorption % display on ASM



Fig The de colorization photo

The photos clearly show the effective treatment done by the simple gadget. This gadget got the best kaizen award by QCI, QCFI, Papyrus and more than anything else, the farmers have started using it.

## V.DATA ANALYSIS AND INTERPRETATION

The data is so explicit that we don't need any statistical tool even a graph to interpret it. All the participants with little hand holding has resulted in considerable improvement at national and international level.

The innovation, originality creativity is within everyone. Only not explore due to type of life style and virtual world exposure or for various other reasons.

The immediate tendency was to take projects related to competition and focus area, no innovation was seen.

However, while developing the solutions and analysis creative participation, synergy effect and originality was noticed.

Although patents are considered as one of the criteria, team is more comfortable to share the knowledge without any IPR, they want the good things shall be multiplied for the society.

The most remarkable point is - no external grants and funds were utilised and individual members contributed for the projects, fees, and infrastructure.

We started the training with a simple board and chalk and later on, a laptop, LCD, Wifi , group app, hardware, soldering guns, boards, components, support organisations, institutes and industry association all was added as and when needed.



The centre is well established and willing to take different challenges posed by Niti Aayog, the Start-up ideas to make India proud. We are sure for this social engineering with help of the Lean, and simple problem-solving tools and creativity training and mentoring has a great contribution and can be rolled out as model for innovation development.

The development of individual and the team and society is a great contribution and we are proud to be members of this drive.

Value education and role model driven grooming resulted in effective change management.

Is proven as in a team some focus drive & dedicated efforts to follow the value stream mapping and role model using science park Mysore centre has resulted in effective change management. The team was doubtful themselves about the results and their performance due to lack of proven success story. Now they are sure the simple difference in success, and otherwise is following a method, or a model and waste identification exercise. The experiments and development training in these lines has resulted in discovering the originality and creativity that was within them never explored before and then innovation was just an evidence driven fact, application of ideas not very difficult, are the feedbacks in nutshell.

Thus, a dedicated model for incubation resulted in Innovation hub that groomed the teams and developed projects that has positive impacts on society.

The typical awarded and proven projects include – Water purifier, MMI – Measure, monitor and improve devise with integrated risk and water management. Level controller with voting logic. Bio gas to salvage solid waste. The solar lamps for renewable energy. Access control based on biometric and integrated system. Various android based apps for distribution of agricultural products. Reduction of waste, by control at original level. Tissue culture and bio tech projects related to agro productivity. Safety of kids, senior citizens and other vulnerable member of society.

## VI. SUGGESTIONS

Such group development and interaction model based on technology park and mentoring, counselling analysis and hand holding for individual and group for synergy proven to be very effective and can be adapted by other and can be extended for remaining members also.

Projects in Hand includes and continues the same focus areas such as- school safety, Agricultural development by tissue culture and horticulture, app for farmers to consumer connect, common platform development, climate change mitigation projects on renewable energy, as biogas, solar lamps, stoves and maintaining disposal camps for clean India.

Typical school level safety projects are as listed below.

**Walk to school safely** – Alarm and intimation system in case of anticipated risk of accident, abuse. – An engineering project using blue tooth and small electronic gadget.

**Bicycle rider safety** - A bicycle gadget that helps auto balance and safety alarms, and intimation.

**Student transportation**– Online geo tracking system of all students and their transport vehicle

**Playground injuries**–First aid training app and handy kit

**School indiscipline**– Value education and Mentors team

**Challenges posed by Field Visits, Excursions, Social Programs** — First aid app and alarm unit

**School violence** – Counselling and awareness app. SMART connect

**Youth violence**– Youth and Value education app. A dedicated counselling and meditation guide with planned interactions with experts.

**Vandalism**– Developing the super kids’ app, to identify the attitude and guide the students to control their emotions

**Sexual abuse**– App for the victim and app for the accused are different and mentoring dedicated case to case is offered

**Suicide**– Early detection by a dedicated inventory mapping and counselling app.

**School Health Index**–A survey tool to analyse the current situation, gap and prompts corrective and preventive actions with handy solutions.

**Dangerous intruders**– The security app that makes school security tech savvy controller.

**Gang violence**– Teachers app that help them to identify and mitigate the gangs being developed. If already a gang is formed, then assigning roles and responsibilities to keep them in positive occupation are prompted.

**Fire& Earthquakes**— Fire and safety drills training based on app dedicated to individual set up

## VII.CONCLUSIONS

A dedicated mentor can initiate a change. Students, individuals are looking for change, and one can initiate and mentor the change by sparing little time for society, this is far creative than living in the virtual world of entertainments and social media. If adequate options are provided the teams are willing to get out of the routine, take up social challenges, address them with creative solutions and as a result a SMART incubation centre gets transformed into an Innovation hub. Farmers are no longer wanting their children to continue the farming. The unpredictable rains, hard work, fluctuation rate, and demand cycle delay are some of the major attributes. We through Smart Incubation centre started working towards this high-risk element and major social impact to find viable solution to minimise the risk and waste. The lean concept is used for waste identification and management. The concept got sponsored by VAMNICOM cooperative management training centre through Mr. Goel and Smart team led by Tissue culture and horticulture experts coming together with management wizards and Software programmers.

## VIII.ACKNOWLEDGEMENT

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