

Workshop on LEAN MANAGEMENT

- 
- What is Lean Management?
 - What benefits do I accrue?
 - How can I apply Lean Principles to my Business Organization?

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Organized by



CHAMBER OF CONSTRUCTION INDUSTRY SRI LANKA

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1. Opening Session



1.1 Welcome Remarks by Dr. Surath Wickramasinghe, President Chamber of Construction Industry of Sri Lanka

Welcoming the guest speaker Professor Iris D. Tommelein, distinguished speakers Engineer Eshan Jayamanne, Duleesha Wijesiri, Directors of CCI and distinguished guest, President of the Chamber of Construction Industry Dr. Surath Wickramasinghe, described the meeting as an opportunity to get an insight to Lean Management in the construction industry, thus proving Lean Construction as a suitable concept to be implemented in Sri Lanka.

Explaining the history of the Chamber of Construction Industry Dr. Wickramasinghe said that the CCI has been in existence for 16 years, and the APEX body of the construction industry. The CCI has been constantly highlighting national issues such as skill shortage, the problem of flooding and the solution, water conservation solving the garbage problem including the advances of technology connected to the construction industry.

Introducing Professor Iris D. Tommelein Dr. Wickramasinghe said that Professor Tommelein is an expert on construction, site layouts and logistics as well as material supplies and chain management. Her work experience is in commercial buildings and industrial construction. Much of her work builds using IT support product designed, planning, scheduling, simulation, visualization such as the development of Building Information of Model, which is becoming popular in Sri Lanka. Professor Tommelein who is an Engineering and Project Manager in the Civil and Environmental Engineering Department at the University of California Berkeley, teaches and conducts research to develop advance theory and principles of project based product management, which is not limited to architecture engineering construction industry what is termed as Lean Construction.

1.2 Introduction to Professor Iris D. Tommelein – Mr. Eshan Jayamanne-Engineer

Calling it a privilege to introduce Professor Tommelein, who directs the project production system laboratory at University of California, Berkeley, USA, Mr. Eshan Jayamanne said that the laboratory is dedicated to developing and deploying knowledge and tools for project management as well as a learning lab for the Northern California construction industry. Mr. Jayamanne further said that Professor Tommelein received the Lean Pioneer Award 2015 from the Lean Construction Institute, recognizing an individual or an organization who has moved the design and construction industry forward in embracing and implementing Lean tools techniques on capital projects.

2. Session 1



2.1 Overview of Lean Construction, Application of Lean in Manufacturing - Professor Iris D. Tommelien University of California, Berkeley, USA.

Speaking on the history of Lean Management Dr. Iris, said that Lean construction was discovered in the late 1980s, where documents which were written by people working in the Toyota Company for more than thirty years, was translated into English. This information totally upset the American Automobile manufacturing world. Hence some countries needed to change the then governing practices in the United States. In addition to discovering this new way of thinking, which is called the "Toyota Way". It also brought to light that the current project management practices in construction was inadequate to address the complexities and speed at the projects which were delivered. Professor Tommelien emphasized that while many projects failed, over budget, projects were not satisfactory. With this, new theories of production and production management evolved. this showed that there was a lot of good ingredients to change the way of thinking and to change the way of practices and to improve Construction so that it will become a long term sustainable industry for everyone.

Giving a brief detail on the Toyota Company, Dr. Tommelien said that Toyota production systems which started in the early 1950s with the chief architects Trichy Ohio and consultant Shigeo Shingo were faced with the challenge of very limited cash and space in Japan. Thus Toyota wanted to build and design cars, for a very limited population. Toyota set out as its brand ideal to develop the custom product delivered instantly with nothing in stores. Dr. Tommelien explaining one of the ways America discovered Lean was when a study carried out By Howard in 1980 where manufacturing Companies were asked to find out what was happening in Japan, and why General Motors could no longer compete in the World market. However, researchers discovered that not so much in Japan in general where things were different specifically at Toyota.

Providing an example where Lean management works, Professor Tommelien said that in terms of number of hours which vehicles are produced at Toyota in Japan, Toyota was spending 16.8 hours per vehicle produced, whereas Companies in America was spending 25 hours per vehicle. Stating that Lean management is always interested in productivity, logistics how long it takes to produce buildings. Toyota's system relies on a number of principles which are grouped as 4Ps, namely philosophy (long term thinking) process (eliminate waste) people and partners (respect challenge) problem solving (continuous problem solving).

This, Professor Tommelien opined is what Lean thinking is about. Lean thinking is about developing learning organizations that are engaged in continuous improvement. Lean can be defined as a philosophy it is not craft production where every product is unique, it's also not mass production. interested in customization, specialization in offering variety. Professor added the definition is "to do what the customer wants, to do it in no time, with nothing in the stores." Questioning the vision in the construction industry, Professor Tommelien explained that it is very important to have a vision for one's company, there by spelling out the values one wants its employees to live by.

Speaking about waste in the industry Dr. Tommelen explained seven types of waste. One type of waste which is inventory, in traditional western accounting systems this was not considered waste. The other type of waste is waiting, having workers wait for material, often buildings are partially completed waiting on materials waiting on workers. Another waste is over production, where extra work is done because, not knowing whether all the products produced have met the quality requirement. Another waste is defects. When there are defects the need to order more products, as a result paying more money. Professor Tommelen pointed out that it's important to remember that Lean thinking, systems thinking affects the other parts. Waste is defined as anything the customer is not happy to pay for.

Looking at Lean as an operational strategy, Professor Tommelen gave an example from the industrial power plant construction. The example has to do with design of support for systems. The current state is mapped in what is called a value stream map. This distinguishes the value adding time where, the customer is happy to pay for it.

Spelling out the productivity mind set in construction, Professor Tommelen said that this occurs when performing the tasks of assigning engineers, assign people to do the work. The consequence of trying to optimize all these different people involved in the system if one is to follow a pipe support from its original conception, all the way through all the different steps, there is a lot of waiting. The waiting time is taken as the non-value added time. As everyone is optimizing the time there is bound to be a backlog, which is a negative aspect when it comes to deliver a project fast and effectively. Making a distinction between value added time and non-value added time Professor Tommelen said that Non value added time tends to dominate what one does, whereas the consequence is that the project takes a long time.

Explaining the consideration Lean likes to propose. Lead time is identified as the time period it takes to produce, this is also known as resource efficiency, in construction it's called productivity. Resource efficiency is when there is greater resource utilization of higher productivity it is a positive sign. In construction, utilization is maximized for all the people involved, for all the equipment.

Lean Construction Triangle

Highlighting the aspect of project delivery, it was noted that many dimensions need to be addressed. organizations where people are involved in delivering a project, there are commercial terms called contracts, regulations which will govern how projects can be run. However, the Lean operating system is often overlooked. The Lean operating system is seen on how the people work with one another, the values, principles, the operations one follows, what strategy one has and what tools one has, to achieve what the company wants to achieve.

2.2 Application of Lean Construction Project: Last Planner -Professor Iris D. Tommelen University of California, Berkeley, USA

Last Planner System

When promoting the Lean management, the house of Toyota focuses on the two pillars, namely the Just in Time Pillar the other is called Idea Pillar. The Just in Time pillar is called the 'Go' pillar and the Idea Pillar the stop Pillar. Accordingly, most of the projects in the States are planned on a schedule, using a method called the critical path method. The work is broken down at a relatively high level, the schedules that are used are of high level to help understand how the project as a whole is going to be delivered. In the United States contract schedules are used to report back to the owner on the progress of the work. This includes the payment for the work.

There are project objectives, where project information, planning the work. Work gets represented. overall schedule. Mobilize resources people material information site space. Everything that has to be done.

Dr. Tommelen who spelled out a practical exercise to be carried out by Companies, called on those present to list down tasks which can be completed the following week. The task should be small enough so that it can be completed. This exercise has been carried out in the States. Once the week is completed one is asked to see how much of work on the list was completed.

The outcome interestingly enough would come to about 50%. The question arises as to whether it matters if the task which was listed was unable to finish. Surprisingly it does matter because if one plans to do some work an investment on resources has been made and if that work does not happen, resources have been wasted.

Different Levels and Different Timing for Planning/Scheduling

Develop increasing levels of detail and closer in time with greater certainty needed because whatever you plan, things will NOT go 100% as planned

Master Plan (entire project)

- **Project feasibility**
- **Major milestones**
- **Major equipment**
- **Phase Schedule (entire project in more detail)**
- **Bring together groups of participants to work out interfaces based on their expertise and capabilities**
- **Look ahead Schedule (e.g., 4-6 weeks)**
- **Pull resources as needed**
- **Weekly Work Plan (or Daily Work Plan)**

Purposes of Master Schedules

- **Demonstrate the feasibility of completing the work within the available time.**
- **Develop and display execution strategies.**
- **Determine when long lead items will be needed.**
- **Identify milestones important to client or stakeholders.**

Phase Scheduling

- **Purpose: Produce a plan for completing a phase of work that specifies the handoffs between work groups.**
- **Participants: Representatives of the work groups plus other stakeholders.**
- **Process:**
- **Define deliverables and scope**
- **Develop logic network using backward pass**
- **Apply unpadded durations to activities**
- **Replan as needed to generate slack**
- **Assign slack (schedule contingency) to critical and variable activities**

Purposes of the Look Ahead Process

- **Shape work flow sequence and rate**
- **Match work flow and capacity**
- **Maintain a backlog of ready work**
- **Develop detailed plans for how work is to be Done**
- **Safety, environmental, quality issues**

Who is the Last Planner?

The person or team that gives assignments (makes requests for commitments) to production units such as design squads or construction crews. The last planner has been used extensively in construction and design.

Quality Characteristics of Weekly Work Plans

- * **Definition**
- * **Soundness**
- * **Sequence**
- * **Size**
- * **Learning**

Explaining yet another technique in Lean Professor Tommelien called it the 5WHYs, which is a quality management method of problem solving that tries to get to the root cause of problems.

- **When a problem occurs, one should ask: “Why did this problem develop?”**
- **After coming up with an explanation, one should then ask again “Why is that the case?”**
- **One should continue with this repetitive inquiry until at least 5 “Whys have been asked and answered.**
- **The answer to the last “Why?” will give insight into the original cause of the problem.**
- **The strategy for fixing the system is to then eliminate that original cause. it’s a quality management method**

2.3 Summary

The planning system is a combination of “should”, “can” “will;” and “did”. There is an opportunity to think about the purpose of ‘why are we planning’ ‘what are we doing in planning’. These methods and the tools gives an opportunity to become more purposeful and improve the performance.

2.4 Question and Answer Session



Participants at the Workshop

Question

1. In the Sri Lankan context one of the main reasons for plan failure is Labour problems, whereas Professor in your presentation it is the least important issue, can your emphasis on this?

Answer

Professor Iris D Tommelien.

I would like to use the phrase they use in teaching, if the student has not learnt the teacher has not taught. I would like to argue the same in construction, that if the worker does not work then the management has not done their job. I think there is a significant role to play by people who are involved in managing projects, in making sure that labourer is ready and able and qualified to do the work. We have asked them to do. I would not blame labourer. I was on a project site, what struck me is that both sites had about 60 sub-contractors by American standard if we have a large building project site we may have about 25 sub-contractors, and we think that as a lot of them. if we have 60 sub sub contractors that becomes a huge number of people to manage. I am wondering if there is some consideration to be given to the structure of the construction industry in Sri Lanka and how one would want to restructure it, so that direct hire of labour by companies become more attractive proposition, than what it appears to be today. There seems to be a resorting to sub-contracting because of labour regulations. I may be wrong, but if we hire people, they should be given their benefits.

2. Question

Professor you made an interesting point when you said "the more you detail a schedule, the more you tend to deviate from it" this is a common problem in Sri Lanka. Can your advice on project planning taking an example of constructing a house, where do you draw the line in the amount of detailing you do?

Answer.

Professor Iris. D. Tommelien

The answer is what do you want to accomplish? In any project you need to procure materials that you know is difficult to get. you need to be able to identify the materials. and if the materials are freely available you don't need to worry about them. same when it comes to mobilizing equipment, if there is large equipment it's difficult to get it. You need to have some expertise to go through your planning system, to figure out when is the correct time to plan it out. You can't have a general plan without knowing who is going to do the work.

3. Question

Many Companies do not understand the concept of Lean, when comparing with countries who have adapted the Lean method, what is the progress or percentage in terms of budget and time.

Answer

Professor Iris D. Tommelien

They are much more predictable in what they can do. working with contractors to develop capabilities with contractors, we have also worked with owners to meet the demand for lean, because they understand that they have a lot of value for them, if they have a lot of waste, somebody pays for it and it is usually the owner. So owners have begun to ask for Lean qualifications from contractor's practices. We are moving to have more public owners. At the same time, we have seen a number of companies on their own go out and reap the benefits for themselves in becoming more Lean organizations, on how they deliver the projects.

4. Question

In terms of time and budget how do they perform compared to non-Lean contractors?

Answer

Professor Iris D. Tommelien

We have some information on the Health care sector where some 20% less cost and deliver more value.

5. Question

If a Company was bidding for. the Companies adopted Lean practices will be more successful in getting that project

Answer

Professor Iris D Tommelien

Yes, that Company will have the benefit.

6. Question

You have shown less planner as to lean. we see a lot of people putting up sticky notes on the wall, I appreciate that your presentation is more general, can you talk about more about this posting which is being developed, to me it looks like we are going back in time ?

Answer

Professor Iris D. Tommelien

You can explain the methods, the concepts but it does not necessarily mean that everybody who hears you fully understands what they are doing. Let me explain the technology question first and then I will explain the method.

Where we were in 1970 where we had main frame computers, we had people sitting at these computers running their schedules. The person who had the computer, used to be the king or queen in the room, because they controlled the schedule. Computers can be misused in that sense. We do use computers but the challenge is that projects are not just computer systems. We call projects "networks of commitments" projects are people involved working with one another, making offers making promises, accepting to do certain things, making commitments. That's what projects are. If the computer can help you with that, it's great. But it should be people making reliable promises, therefore when you have a master schedule, and when you know who will be doing what, we want them to get together. We want them to know each other as they will be on the site, we need them to understand the constraints on the site. That's how one could activate commitments. This can be easily done if we have sticky notes. Sticky notes are a very democratic tool, everyone can use sticky notes, we can move them around, it's a very practical distributed project planning tool. It is for those reasons that sticky notes are great.

7. Question

Delay in making payments is an issue in Sri Lanka due to this the contractor gets bank funding to get a higher rate, how do we address this issue in Lean Management?

Answer

Professor Iris D Tommelien

We try to promote transparency on projects. Secondly convince the owner that it is in his best interest to pay faster. thirdly to find out how one could expedite the payment.

2.5 Application of Built in Quality -Professor Iris D. Tommelein

Defining the term "Quality" in the construction field Professor Tommelein said that it is consistently producing a product (outcome)that meets the customer's expectations which is fit for the purpose intended.

The key word is consistency. we need to do over and over again without variation. Another definition of Lean is recognizing the world is subject to all kinds of variation. There is good variation from bad variation 'Lean' starts by relentlessly driving out bad variation, and then buffering where needed to alleviate its impact. There is two main types of variation namely process variation and product variation.

Explaining Process Variation Professor Tommelien said that it is when supply and demand occurs 100% where a perfectly reliable work flow. Occurs. Demand variation is when there is some change in the schedule, then even if the demand is 100%, alternatives are looked into.

Professor Tommelien pointed out that there is always a problem of an imbalance on the supply and demand. The problem exists because of the variation in the system.

Explaining product variation Professor Tommelien said that what is good variation for one will not be good variation for another. It all depends on what is important to one, the values.

Pointing out that in addition to learning from experiments, Professor Tommelien said that one can learn through Learning breakdowns. if there is a breakdown it should be detected, correct the situation, analyze and to take steps to prevent a recurring.

Lean is very much promoting people to become scientific experiment, systematically going through the exercise of "what can we do to achieve better performance" Emphasizing the Lean Ideal; Do what the

customer wants, in no time with nothing in store, Professor Tommelien said as much as its important to talk about Lean and quality, it's important to talk about Lean and sustainability. Lean provides an operating system, the tools, the methods, principle to achieve the value that one needs, and if sustainability is the value which is needed you to achieve what you want to achieve then Lean is the best tool that is currently available.

2.6 Lean Implementation in Design and Construction: Work Structuring & Case Study in Construction

Sighting a case study in work structuring, Professor Tommelien explained that Lean thinking is systems thinking. Lean project delivery system the highlight of the construction part is labeled as installation which is one part of the production system. Delivering a product starts with identifying the purpose, passing to a designing team what will go to the product and the process. The product design will be passed on to fabricators.,. those components are going to be shipped to the site for installation. There after its operation and maintenance. Talking about Lean management all these components have to be looked into the larger the broader the set of things one can manage the more opportunity one has for global optimization.

Professor Tommelien pointed out that Work structuring in operations mean when a project is started with so much of work to be done, it is needed to break it to smaller pieces. this is the fundamental aspect of planning. Practices of planning are relatively well established, there are standard ways of breaking down the work, this is the way work was done in the past. It is called receive traditions, However Professor Tommelien added that while it is good to think how work it has been broken in the past. it is not necessarily how work is done today. Posing a question for every project, The Professor asked what is it that we need to realize and how are we going to do it. That's the process of work structuring.

2.7 Case study- Light Fixture Case Study

The case study is on the traditional ceiling light. Case study pertains to the installation of 314 light structures; workers are not familiar with these specific light fixtures. Estimate at the time the contract was written says install two and a half light fixtures, two hours. it comes in a box you need to ensemble, install it, wire clip it and lamp and finish it. The team tried to perform this work. It takes about 32 minutes without delay to ensemble. The actual cycle time is about 42 minutes. So is this an acceptable process. Back to the estimate, they thought it takes 42 minutes they do a test, they do it for a 32 average. They go ahead and do it, Professor Tommelien asks whether this is acceptable. Although people will be happy, as they beat their estimate. But can they do better, that's the question, to be asked. In this case one of the things to study is to couple the work together. They were able to finish it before the estimate time, and they were able to faster ways to lift. With a little bit of operation analyze they can get the time down to 23 minutes. when is the time to do this, it should be done several weeks before the work is done. Lots of opportunities for improvement but is this the best they could do?

Having done an operational analyze, looked at all the work at the construction site. It is important to look at t what are the handoff, in this case the apprentice and the journey man which is the light fixture. Another question of work structure, how is the work going to be released, and then the scheduling question, when will the work be done. Those are the questions to be asked. There is a supply chain before going to the construction site. Some of the work can be pushed to the supply chain.

Lean is about always thinking how it can be done better, the more opportunities one may have.

2.8 Question and Answer Session

1. Question

In Sri Lanka a lot of Companies have not started on the Lean journey as yet, in your opinion how can they start this practice?

Answer

Professor Tommelien

There are several places to start the Lean system. The obvious one is when you visit any construction site, is housekeeping. To be more predictable in the flow of work when visiting the construction sites. It has to do with planning as well.

2. Question

At which level do you think people should start on this?

Answer

Professor Tommelien

Contractors could start in their Companies. Owners can implement Lean in their projects. Once the capabilities are available they are keen to supplying it as well. I think some industry thinking should be done, to bring different parties in the construction process closer together. I see huge physical distance between management and labour. In Lean thinking everybody is in the same boat.

3. Question

Do you feel that the top management should be briefed or is it from the bottom level?

Answer

Professor Tommelien

Top management is no doubt very important, but that is not enough. It would probably not work if the top management pushes it down. We have found what works well is to develop pilot projects, to find a few key people who will be interested in trying out and then implementing the last planner. Maybe building some quality programme and then doing your experiments right, assessing what works, how it works. improving from there.

4. Question

Locally we operate with the sub-contractor and have third party labourers, it's very difficult to get insight to the understanding to continuous improvements, what are the special mechanisms that you have used in your experiences?

Answer

Professor Tommelien

What we do is go and video tape operations and analyze it. We don't want to analyze them in practice, we get the workers involved analyze to see what's going on. In many ways people are people what we are finding in the US for suggestions for improvement, they probably have suggestions for improvement they never have been asked. They have been told to do work in one way but they have not been asked, untapped resource to be tapped into. There is something called the eight way in Lean management, the eighth way is human potential. There may be an opportunity there.

5. Question

In manufacturing we adapt the team leader group leader concept is there something similar you could propose to adopt in to construction?

Answer

Professor Tommelien

We talk about self-empowered team. The team that does the last planner. the process needs to have permission to accept work and is there permission to say no I will not, because the requirements are not there. It's not safe work that's a big step.

3.Session 2



3.1 Case Studies with Finelite and Webcor Builders- Engineer Eshan Jayamanne

Project Engineer Eshan Jayamanne of Webcor builders a firm based in California is engaged in general contracting, self-perform concrete interiors and dry wall. Mr. Jayamanne said that since there is a lot of construction going on in San Francisco and the company utilize a lot of lean practice, one of the main reasons for the company to focus on Lean is that they have realized and taking into consideration the statistics that 50% of the construction work is non value adding . Questioning as to from where does the 50% come from, the waste comes from waiting for material, labourers waiting for the design, changing of design, all these things cause the inefficiency.

Mr. Jayamanne opined that Lean at Webcor is a culture, where the company will bring on from the CEO all the way to the labourer. Educating each other, having continuous improvement sessions to really implement these lean techniques. In terms of implementation of these methodologies, the Company has Lean in the planning area as well as Lean methods in operation. In terms of planning, the last planner system, co planning and big room planning, where Sub Contractors, designers have a conversation and understand the requirement before doing the work.

Focusing on the operations, continuous improvements Mr. Jayamanne said that they have sessions with the labourers, engineers to improve operational analysis, video footage observation and the 60 seconds Lean is adapted.

Emphasizing on the five S specifically standardization, lay out and product floor. Standardization means reducing variation. By creating Rapid Processing Improvement Workshop (RPIW) the organization identify certain tasks and bring in the people who are involved in this particular task, analyze the current process, and look at the waste the opportunity . Creating floor charts with a future processing mind, reducing, and waste. Through this the Company create the standardize package in order to put it into practice. The concept of Wheels on carts are used when material come on to the site before it is loaded on to the site, it is put on wheels so that people don't have to carry the material. Which will reduce the productivity.

In order to track the worker, the Company has introduced a smart tool an application on the smart phone that track the worker movements. From this the Company tries to analyze where material is staged, whether they are moving too much away from the installation location. Whether some of the sub-contractors are coming in the way creating constrain work areas. For us our major goal is our crews have to have specific areas where there are no constraints.

Another Lean management tool being the Foreman training is in operation in the Company, which Mr., Jayamanne says it's something to look at very seriously. It is all about providing a career pack for the labourers. Further explaining Mr. Jayamanne said that It means an apprentice coming in organization with their skill levels it all about identifying that 8th waste, which is utilizing employee's talents.

As a means of motivation the labourers also provide added compensation as terms of salary and insurance to keep them motivated. This has shown a lot of improvement from the labourers, they bring in some great

ideas. it's all about getting your labourers to see the waste. And getting to do that Mr. Jayamanne says that you have achieved 50% of your goal.

Time and motion studies is another we look into. We have set up cameras through all our construction sites. By the end of the week some of the engineers will analyze some of the footage and see where we need to improve opportunities and reduce some of the waste.

We use the matrix how difficult it is and the impact is it to create some sort of change. we really focus on the medium of high impact categories but also things that are easy and moderate easy to implement.

Safety strategy is another tool adapted by the Company which tracks the best practices the incidents, misses or recognitions. this tool is available to all the employees in our organization, the organization to have a certain standard within the company.

3. Session 3



3.1 Lean Implementation in Construction Process in Sri Lanka – Duleesha Wijesiri and Nilmini Thilakarathna

Mr. Duleesha Wijesiri Highlighted the core concept of Lean which is production construction and manufacturing. Also known as conversion activities secondly it is the flow activities. Basically the conversion activities will produce tangible outputs, whereas the flow activities will bind conversion activities together. Conversion activities can be identified as concreting, plastering, tilling, whereas flow activities inspection, moving waiting. Both activities consume cost. But only conversion activities add value to the final product.

Highlighting statistical data Mr. Wijesiri pointed out the important of adapting the Lean method. Research has found that poor material management causes 10-12 % of total labour cost. Nonconformance quality cost consumes 12% of total project cost. Time used for non-value adding activities amounts to 2/3 of total project time. Whereas 49.6% of construction operative time is for non-value adding activities. Lack of safety measures amounts 6% of total project cost. Majority of time in construction devoted to wasteful activities.

Mr. Wijesiri opined that Lean can earn. It can earn a person money by ways of saving cost, it can earn time by saving on the non-value activities. It can earn quality by enhancing the quality of products through eliminating the wastage in production. This concept of Lean construction will enable one to gain advantage in cost time and quality. These are the three main aspects in a project. Lean construction can be used as a strategic option to gain competitive advantage to any construction firm.

Mr. Wijesiri queried as to whether Lean construction be successfully applied and implement in Sri Lanka? It was found that there are about 15 types of waste in Sri Lanka. Most of the construction professional was not aware of the non-value adding activities.it was also revealed that awareness among construction professional was not that high.

Mr. Wijesiri said that it's important to eliminate these non-value adding activities. if it is to be eliminated, one should look into the 5 Why's, as the root cause should be tackle .in order to do this Lean method techniques should be used. There are about eight main causes of non-valuing adding activities in the Sri

Lankan construction industry. In order to eliminate this non value adding activities. It was also found that the causes for this non value activities is giving way for different levels of non-value activities. In order to overcome this problem one has to implement these Lean techniques.

3.2 Summary

- **Lean Construction can earn many benefits**
- **There are many Non-Value Adding Flow Activities in SL Construction industry**
- **Lean Construction is a Suitable Concept to be implemented in Sri Lanka to eliminate Non-Value Adding Activities**
- **Even though several Lean Techniques are practiced by firms, the usage is at an immature state in Sri Lanka**
- **Learning and implementing Lean through a proper framework will earn Strategic Benefits to any**

3.3 Question and answer session

1. Question

How much of the 50% of non-value adding activities can be eliminated?

Answer

Mr. Eshan Jayamanne

I am a firm believer of Lean so we can do with the full 50%. It is the continuous improvement we talk about within our organization even though from that 25% we see opportunities for improvement. we can really push and achieve 90%.

2. Question

Lean is widespread in Europe and USA what we see in Sri Lanka is a lot of foreign companies, contractors coming here and doing the big projects, they tend to be from companies from China Singapore, do these countries to adopt Lean practices?

Answer

Mr. Duleesha Wijesiri

Based on the literature these countries are practicing Lean concept, but it is like between US and Sri Lanka. They do have implanted some of the Lean practices from what we see here in Sri Lanka.

3. Question

Lean is widespread in Europe and USA what we see in Sri Lanka is a lot of foreign companies, contractors coming here and doing the big projects, they tend to be from companies from China Singapore, do these countries to adopt Lean practices?

Answer

Mr. Duleesha Wijesiri

Based on the literature these countries are practicing Lean concept, but the situation is between US and Sri Lanka. They do have implemented some of the Lean practices from what we see here in Sri Lanka. But they are not going full force in this regard. However, they have better Lean implementation than in Sri Lanka.

Answer

Mr. Eshan Jayamanne

I would like to explain how it is done with our parent Company in Japan. They have given us the opportunity

to develop this Lean practice. What we have seen is that these Japanese Companies have so engrained this practice into their system. They probably don't call it Lean but they follow it. This is what we saw, and that's why we are really pushing hard towards these goals.

4. Question

A lot of construction will take place in Sri Lanka, do you think that the Sri Lankan firms are as competitive as the foreign companies which are coming to Sri Lanka?

Answer

Mr. Duleesha Wijesiri

One of the disadvantage in Sri Lanka is in some of the big projects our contractors are not able to provide the work force due to the capacity of the projects. if we talk about the Lean principle the advantage Lean provides whether that has an effect in getting these projects, then since the practice is not that much in Sri Lanka probably the construction of the local contractor could be on the higher side compared to a Company which has implemented Lean construction concepts thoroughly than here. However, if you talk about the contractors who are coming here to Sri Lanka, expertise wise and cost wise they will be able to compete each other, it could be a hindrance too. As they do not practice that much of Lean in Sri Lanka.



Presentation of tokens of appreciation presented to Professor Iris Tommelien. Mr. Eshan Jayamanne and Mahanama Jayamanne by Mr. Surath Wickremasinghe

3.4 Vote of Thanks



The Vote of Thanks was delivered by M. Nissanka N. Wijeratne who expressed much appreciation to Professor Iris D Tommelien. for gracing the workshop, and sharing her expertise knowledge on the subject amidst her busy schedule, on her way to attend yet another session in South India. Mr. Wijerathne also expressed gratitude to Mr. Eshan Jayamanne and Mr. Duleesha Wijesiri for giving a firsthand experience on the use of Lean Management in the construction industry. President of the Chamber of Construction Industry Mr. Surath Wickremasinghe and members of the CCI and the distinguished invitees for gracing the occasion while pointing out that the workshop would have no doubt been very helpful.