Lean Operations Application to Office Environment

by

Ms. Pornwipa Booncharoensuk

A Final Report of the Three-Credit Course
CE 6998 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer and Engineering Management
Assumption University

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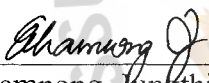Ms. Pornwipa Booncharoensuk

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Project Title	Lean Operations Application to Office Environment
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Academic Year	November 2004

The Graduate School of Assumption University has approved this final report of the three-credit course, CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

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November 2004

ABSTRACT

The objective of this project is to study the lean applications and strategies concepts for improvement and eliminate waste. Basic concepts of lean manufacturing; there are 8 wastes meanings of lean and 8 types of lean modules to be tools for improvement and waste reduction.

Based on the analyzing current environment data, we found out numerous of wastes and non-value added in organization, we developed and approached an idea for improvement of the current situation problem. Lean implementation starts from the 6S, the environment in the office after implemented becoming cleaner, tidy, documents and material are at its places and easy for judgments. As a result of implementing lean we could see some waste or unnecessary materials there. We then apply some lean concepts for further improvement by CEDAC, Kaizen and some concepts of Value adding from VSM technique to resolve the keeping stock of garment samples in the office and papers. The paperless solution improved after applying Kaizen concepts, number of papers and office facilities reduced, on the other hand, the wait time process to deliver document to supplier also reduced automatically. The sample kept in the office also decreased after eliminating duplicate sample request from each department.

There are still some problems left that are not yet improved; the next phase and further improvement could be done with the most important; that all employees or people who need to implement lean concepts must adhere to the guidelines maintain an environment in which everyone should clear his or her role and tasks, rights, obligations, impacts and responsibilities.

ACKNOWLEDGEMENTS

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I. INTRODUCTION

1.1 Background of the Project

Lean Manufacturing was born and raised in Japan. Lean is based on U.S Statistician William Edwards Deming's principle and it was originally named the "Toyota Production System". The American Auto-Industry had to adopt this system in order to survive and remain competitive; therefore the need to switch the name to "Lean Manufacturing".

Lean Manufacturing is changing businesses around the world through techniques that create outstanding results and translate directly into bottom line profits. It is not uncommon to save thousands of dollars by implementing simple lean manufacturing techniques.

Within the concepts of Lean manufacturing, it can guide you to improve process, adapt lean principles and practices in ways that will work for offices and employees which can lead to develop a successful lean implementation strategy created.

More and more often, Adidas hear comments from their suppliers that the business with Adidas is becoming more difficult. Over the years, while Adidas have managed to increase the product volume marginally, the amount of products and the level of complexity increased exponentially. This makes production at Garment Makers and Material Suppliers end very complex. We go out and preach to Garment makers and mills suppliers to become leaner and faster, yet Adidas internal processes and efficiency level are getting worse. It's embarrassing to hear comments from suppliers asking "why can't Adidas internally get leaner?" Adidas are taking every step possible to improve the situation by taking accountability and push back the nonsense from all ends. And Adidas will continue to do so in daily business but the concern is that unless upper

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management pushes back the accountability to the source of the problem (sales/marketing) at the highest level, we are a long way from where we need to be.

In an office environment, the improvement points are numerous. One could even improve endlessly. However time, technical, financial and human resources are always limited. Improvement groups or individual may suggest changes just for the sake of suggesting. Yes, the purpose of suggestion system is to gather ideas, yet improvement should strive to increase added-value, meaning profit, or eliminate waste. There is no absolute standard for judging improvement ideas, the Continuous Improvement then, once changed; we will keep on improving to make everything better and be lean.

1.2 Objectives

The main objective of this project is to study and analyze Lean concepts and develop tools to implement lean in office place which I do believe that Lean can enhance performance of employee and facilitate office facilities to employees.

The objectives of this project are:

(a) To study and analyze how to apply lean and 6S to achieve greater speed in workplace and office facilities.

(b) To create tools to implement lean in office operations

(c) To keep management and employee inform of utility of lean

(d) To drive and fine tune improvement activities concepts

(e) To facilitate office facilities and employee's operations.

1.3 Scopes

This project focuses on 6S and Lean concepts by applying these two approaches together. The scopes of this project are:

(1)   Basic principle of Lean manufacturing and visual tools

(2)   5S and Visual Displays

(3)   Approaching an idea to improve and eliminate waste in office environment based on Lean concept and reduce variation

(4)   Showing Waste reduction in keeping Product samples and Cost reduction for submissions documents from Adidas to suppliers.

II. LITERATURE REVIEW

2.1 Lean Manufacturing

What is Lean?

Lean Manufacturing was born and raised in Japan. Lean is based on U.S. Statistician William Edwards Deming's principles and it was originally named the "Toyota System". In recent years, the American Auto-Industry has to adopt this system in order to survive and remain competitive, therefore the need to switch the name to "Lean Manufacturing"

Lean manufacturing process is about eliminating wastes; Identify non-value added activity in organization then modify, combine or eliminate those activities and using fewer resources to turn out quality products or work processes.

Lean manufacturing is changing businesses around the world through technique that create outstanding results and translate directly into bottom line profits. We can save a lot of money by implementing simple lean technique. Benefit of lean manufacturing includes:

(1)   Reduce lead time

(2)   Optimized space usage

(3)   Save turnover expenses

(4)   Reduce set up times

(5)   Increase profits

(6)   Increase productivity

(7)   Improved on-time shipment

There will still be a lot of benefits and principles of lean which can be reviewed as follows:-

(1) Lean provides tools for analyzing process flow and delay times at each activity in a process

(2) Lean centers on the separation of "value-added" from "non-value-added" work with tools to eliminate the root causes of non-value-added activities and their cost

(3) Lean provides a means for quantifying and eliminating the cost of complexity

(4) Etc.

8 waste of lean (*Muda*)

(1) Over production, making more than, faster than, earlier than is required by the next process

(2) Inventory, any supply in excess of a one- piece flow through manufacturing process

(3) Transportation, Unnecessary transporting parts or materials around the plant

(4) Waiting, idle time created by waiting for inputs necessary for next step in the process

(5) Motion, Any movement of machine or people that does not add value to the product or service

(6) Over processing, Effort that adds no value to the product or service from the customer viewpoints

(7) Correction (Defects) Inspect and Repair of material

(8) Underutilized people, not using people's metal, creative and physical ability

2.1.1. Basic modules of Lean (adidas, 2002)
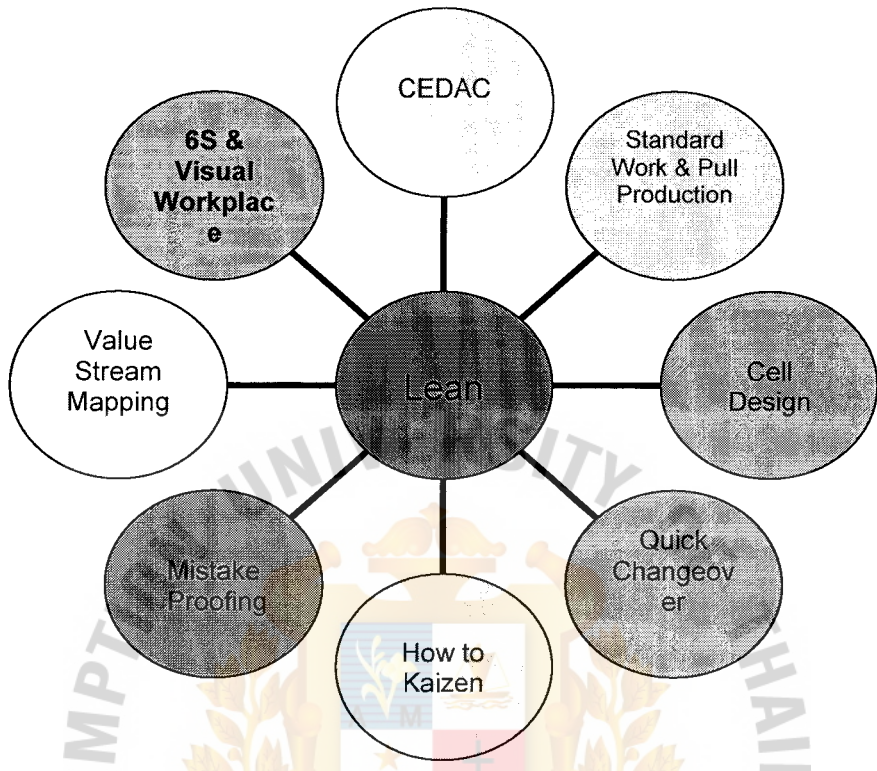
Figure 2.1. Lean module.

(1)   6S and Visual workplace (adidas, 2002)

A good 6S condition, in other words, a clean, safe well ordered workplace with the visual aids is the foundation of improvement. The 6S system also establishes discipline in the workplace that can be used later when additional tools are added.

6S is originally called 5S, 5 Japanese words; Seiri - Sort, Seiton - Set in place, Seiso -Shine, Seiketsu - Standardize and Sitsuke- Sustain. The 5S philosophy is to separate good and bad (waste), improve cleanliness, organization and utilization of the work areas. This improves the use of time as well.

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6S's is a self development; more than that we look at the process of work, workflow of office environment and regulation in office conditions. According to the Safety in organization and workplace, 6th S - Safety should be parallel started and implement activities within the Standard of Engagement rules.

6S is one of the first step companies take in implementing Lean manufacturing or Six Sigma.

Sort, the first S focuses on eliminating unnecessary items from the workplace. An effective visual method to identify these unneeded items is to use tagging to place on all items not required to complete our job. These items are then moved to a central holding area. Sorting is an excellent way to free up valuable floor space and eliminate such things as broken tools, obsolete jigs and fixtures, scrap and excess raw material.

Set in Order, is the second S and focuses on efficient and effective storage methods. Before we set anything in order we should ask ourselves these questions:

(1) What do I need to do my job?

(2) Where should I locate this item?

(3) How many of this item do I need?

Shine, once we have eliminated the waste that has been clogging work areas and identified and located the necessary items, the next step is to thoroughly clean the work area. Daily follow-up cleaning is necessary in order to sustain this improvement.

Standardize, once the first three 5S's have been implemented, we should concentrate on standardizing best practice in our work area. Allow employees to participate in the development of such standards. They are a valuable but often overlooked source of information regarding their work.

Sustain, this is by far the most difficult S to implement and achieve. Human nature is to resist change and more than a few organizations have found themselves with a dirty cluttered shop a few months following their attempt to implement 5S. The tendency is to return to the status quo and the comfort zone of the "old way" of doing things. Sustain focuses on defining a new status quo and standard of work place organization.

Safety, once fully implemented, employees feel better about where they work, the effect on continuous improvement can lead to less waste, better quality and faster lead times

(2)   CEDAC (adidas, 2002)

One of tools for implement quality is *CEDAC*, Cause Effect Diagram Adding Cards.

CEDAC also originally can be called Fishbone diagram or CED, Cause-Effect diagram which was developed by Ishikawa for quality improvement.

The purpose of a cause - effect diagram is to aid in discovering cause and effect by providing a systematic picture of effects and causes.   A cause is a fundamental condition or stimulus that ultimately creates an effect or result of some type.   Cause effect analysis is essentially systematic inquiries to potential causes, given an effect of interest, or consequently systematic inquiries as to potential effect resulting from given causes.

Cause-Effect diagram consists of an effect located on the right hand side of diagram, a series of causes stratified and structured along branches and twig on the left hand side.
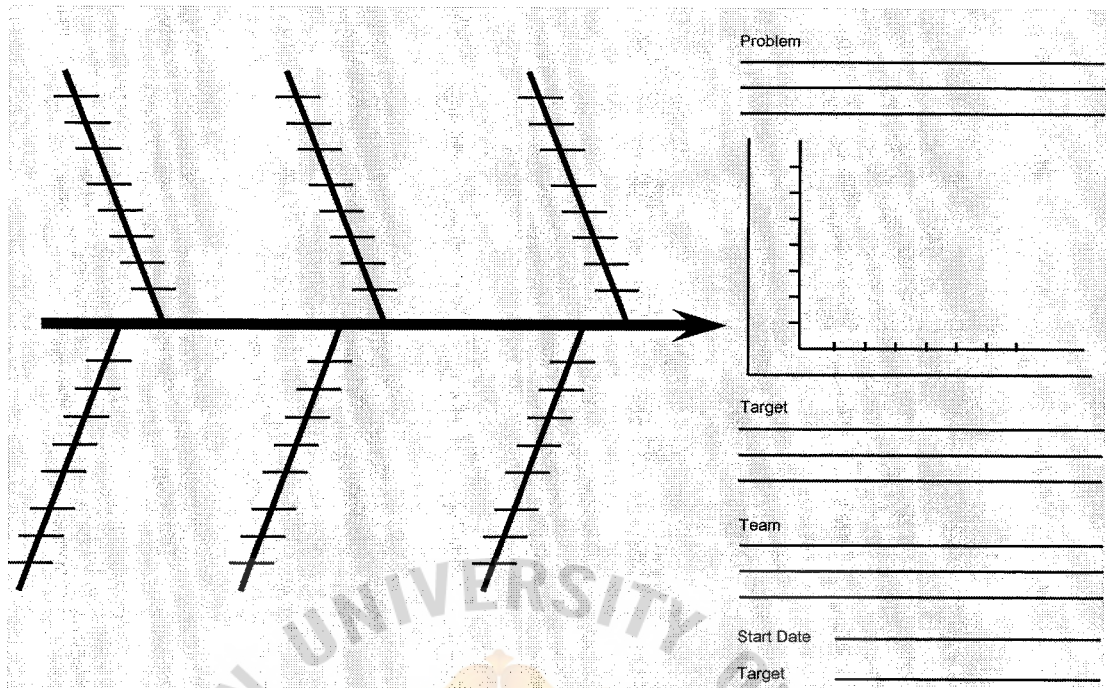
Figure 2.2. Cause-Effect Diagram Adding Card.

(3) Standard work and Pull production (adidas, 2002)

Standardization by understanding and reducing variation, majority apply for production

process.

(4) Cell design *(adidas, 2002)*

Majority of cell design to concentrate on a process improvement technique, focus

on line production (One-piece-flow) that creates self contained unit of equipment and

personnel, arrange in an efficient sequence, to perform several value adding activities

while completing a product or major production sequence.

(5) Quick Changeover (adidas, 2002)

The definition of changeover time is the time between the last good lot off one

production run and the first good lot off the next run. In order to reduce changeover

time there are 8 step processes to be followed:-

Step 1: Distinguish internal from external activities

Step 2: Analyze changeover activity

Step 3: Shift internal activities to external

Step 4: Streamline internal activities

Step 5: Streamline external activities

Step 6: Select ideas to test and adopt

Step 7: Test and practice new ideas

Step 8: Develop new Standard Operating Procedure

Quick Changeover will be resulted on more frequent article or model change, improved synchronization of component parts, resulting to less waste and better quality

(6)   Kaizen

Kaizen means improvement, Kaizen event happens when a group of associates join together to improve some aspect of their business process. The improvement aspect of Kaizen refers to both people and process.

Kaizen activities can be conducted in several ways. First and most common is to change worker's operations to make his job more productive, less tiring, more efficient or safer, to get his buy-in as well as significant improvement. The second way is to improve equipment and or changing the machine layout.

Benefit of Kaizen can eliminate waste and conflict, to get focus on process instead of policies, ensure cross functional cooperation, improve cross-functional communications and improve standardization

What is Waste in the meaning of Kaizen?

Muda means waste, where waste is any activity that does not add value. Reducing or eliminating *Muda* is, of course, one of the fundamental objectives of any quality-oriented person (we have mentioned meaning of waste to lean above)

A simplified view of *Muda* is:

(1)   Wasting time.

(2)   Wasting a consumable resource, such as materials.

(3)   Causing dissatisfaction (including incomplete satisfaction).

Muda is one of the '3Ms': *Muda,* or waste, *Mura,* meaning irregular, uneven or inconsistent, and *Muri,* meaning unreasonable or excessive strain.

There are 3 phases to Kaizen events

Phase 1: Identify the project (Planning)

Step 1: Choose a problem for improvement

Step 2: Select and prepare an area where the kaizen even is to occur

Step 3: Select the leader and the team

Step 4: Describe and baseline the current situation needing improvement

Step 5: Set a target

Step 6: Decide how to measure your progress

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Phase 2: Understand the problem and develop ideas and possible solutions (Thinking out of box)

Step 1: Gather and document facts and information about the current state of the activity

Step 2: Develop improvement ideas

Phase 3: Test and implement improvements (Implement)

Step 1: Prioritize and test improvement ideas

Step 2: Incorporate into new standard procedure

Step 3: Evaluate the event and build adherence

(7)   Mistake Proofing (adidas, 2002)

Mistake-Proofing is a process improvement technology that prevents production of faulty products and avoid cost related to the inspection, disposition and tracking of defects

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Table 2.1. Mistake Proofing Improvement report form.

Mistake Proofing Improvement Report Form			
Team:	Factory		Date:
	Location:		
Operation:	Red Flag		
Defect:	Mistake-Proofing Device		
Source error	Level 1: eliminate at source		
Cost to install			
Time to install	Level 2: detect at source		
Remarks			
	Level 3: detect before next operation		

Current Condition	Improvement Using Mistake Proofing

Seven steps to developing a Mistake- Proofing Device

Step 1: Identify and describe the off grade

Step 2: Determine where the off grade is discovered or made

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Step 3: Detail the current standard procedure

Step 4: Identify deviations from standard

Step 5: Identify the red-flag condition(s) where the off-grade occurs

Step 6: Determine the type of mistake-proofing device needed to prevent the error or off-grade

Step 7: Create the device(s) and test for effectiveness

The benefit we can gain from using Mistake-Proofing is to enforce Standard Operating Procedure or sequence, can prevent product damage, Signals or stops a process if an error is made or an off-grade is created, to eliminate choices leading to incorrect actions and identify problem earlier in the process

(8)　　Value Stream Mapping (adidas, 2002)

Value Stream Mapping is the process from incoming order to outgoing product; to define the process goal, create the current state map and establish process metrics. Mapping using the current state map to identify potential improvements, by collect and analyze process data to apply, identify and remove bottlenecks. There are two kinds of values in this area:-

(1)　　Value added; is an operation or activity that changes, converts, or transforms material into products that customer is willing to pay for.

(2)　　Non value added; is any operation or activity that takes time and resource but does not add value to the product sold to the customer.

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2.2 Continuous Improvement (adidas, 2002)

One of the most fundamental elements of total quality is continuous improvement. The concept applies to process and the people who operate them. Improvement must be continuous; "Improve constantly and forever the system of production and service, Improvement is not a one-time effort. Management is obligated to continually look for ways to reduce waste and improve quality" (W. Edwards Deming).

PDCA Model is the continuous improvement model used for implementing a Kaizen event. Kaizen is the continuous incremental improvement of an activity so as to create more *value* and less *non-value adding* waste.

1. PLAN or STANDARDIZE
Reasons for improvement are identified. Current status reviewed, potential causes analyzed, corrective and preventive actions are determined. Schedules agreed to.

4. ACT
Activities that have been identified as helping to correct and prevent problems will be standardized as part of the process.

2. DO
Proposed corrective and preventive actions implemented.

3. CHECK
Results reviewed and analyzed using quality reporting tools.

Figure 2.3. PDCA Model.

2.3   Visual tools (adidas, 2002)

Visual tools is a kind of equipment in tracking the progressiveness or development of working performance, in the condition that we can get the information obviously via one of the senses of Seeing, Hearing, Smelling, Tasting, or Touching.

2.3.1. Visual Display (adidas, 2002)

Visual display is a method to visually communicate a statement of essential information. The examples of visual display are as follows:-

(1)   Location indicators and levels

(2)   Checklists

(3)   Worksheets

(4)   Flow Diagrams

(5)   Sign Boards

(6)   Status Boards

(7)   Product Displays

(8)   Area Maps

(9)   Process Maps

(10) Product Calendars

The example of office location indicators

(1)   Department names or signage

(2)   Personnel names or signage

(3)   Category product identifications

(4)   Escape routes

(5)   Direction posts to public areas

(6)   Where do you need, what information?

(7)   Pretend you are visiting for the first time to adidas office

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2.3.2. Visual Metrics (adidas, 2002)

(1) What do you need to measure?

(2) Who need to know?

(3) Who can do something with the information?

2.3.3. Visual Controls (adidas, 2002)

Visual Controls tools are methods and devices to gain control of the workplace and everything that occurs within it. Visual Control is the ideal that standard to totally integrate with the action so that deviation from standard is eliminated.

Benefit of visual control

(1) Visual controls can communicate needed information clearly

(2) Visual control can show standard clearly

(3) Visual control can control targeted behavior and or process

(4) Visual control require little cost to implement

(5) Visual control is being easy to implement

Visual controls involve all the sense of SEE, Hear, Smell, Touch and Taste.

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Table 2.2. Visual Workplace Development sheet.

Visual Workplace Development

I. Project Identification						
Target Area: Identify area for implementation			**Area Purpose/Function:** Activities, processes, operations			
People: Those you need to talk to/stakeholders			**Team Members:** The improvement team			
Area Baseline Information: ❑ Area	❑	❑	❑ Baseline			
II. Workplace Organization: ❑	❑	❑	❑	❑		
III. Visual Display: ❑	❑	❑	❑	❑	❑	
IV. Visual Metrics: ❑	❑	❑ Tracking	❑ Display	❑		
V. Visual Control: ❑	❑	❑	❑	❑	❑	

Identify: What needs to be controlled?					
Target: Select a control target.					
Facts/Information: Be specific.		Control Development			
Ideas: • List ideas on how to control • Evaluate each idea (refer to control levels) • Choose most effective idea(s) and place card					
Ideas Selected for Implementation					
Levels of Visual Control		Preparations to be completed for Implementation (Pink Cards)			
		Date of Implementation			

Levels of Visual Control pyramid:
(6) Eliminate Defects
(5) Stop Defects
(4) Alarms
(3) Build Standards into the Workplace
(2) Share Standards
(1) Share Information

III. RESEARCH METHODOLOGY

3.1 Background of organization

Adidas started a liaison office in Thailand in 1989, sourcing both Footwear and Apparel and merged business with Adidas America in 1995. Both operations were merged office locations and moved to the same location together in 1998. One year later Footwear sourcing stopped business in Thailand and since then only Apparel department and Accessory and Gear were managed out of this present office.

Table 3.1. Number of adidas headcount in LO Thailand.

Year	Apparel	Footwear (FW)	SOE	CI	FAD	A&G	Total	Existing staffs in office	Comments
									-
1998	48	32	-	-	-	-	80	80	-
1999	53	-	-	-	-	-	53	53	-
2000	51	-	1	-	-	-	52	52	-
2001	48	-	1	-	-	-	49	49	-
2002	47	2	1	-	-	-	50	50	-
2003	48	-	1	1	1	1	52	52	-
2004	56	-	1	1	1	2	61	51	- 10 Staffs shift to OC at country side
2005	56	-	1	1	1	2	61	49	- 10 at OC at country side - 2 staffs plan to shift to OC
2006	56	-	1	1	1	2	61	48	- 12 Staffs at OC - 1 staff will shift to OC

The Liaison Office (Apparel)

There are 4 major departments in Apparel organization; administration, Development, Planning department and Production department.
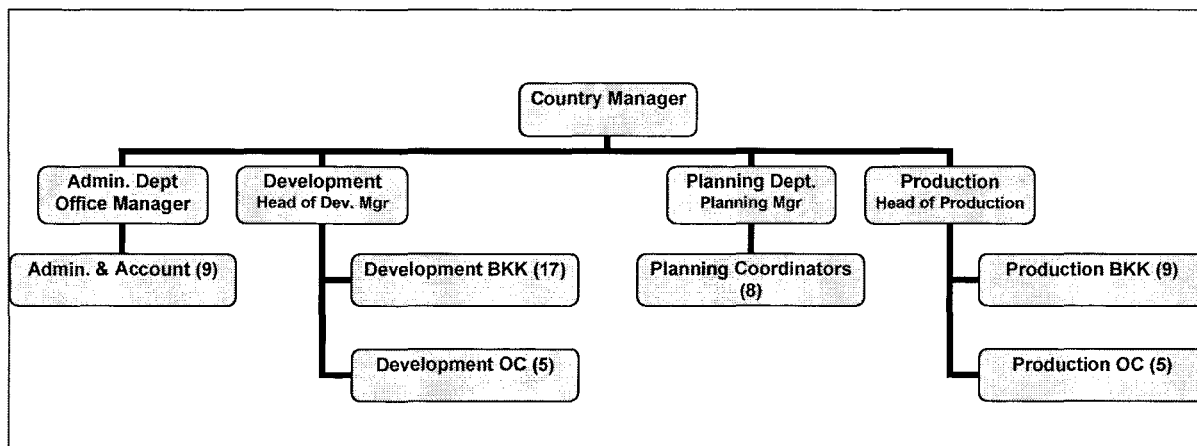
Figure 3.1. Organization chart Apparel LO Thailand.

Development Department

Of all apparel staff, 23 work in the Development area (40%), with 5 relative new team members located at the Operation Centers. Many of them are working with the company over many years. Different teams are organized business specific, led by Senior Merchandiser. One thing we can see is a lot of layers in the development organization but the opportunities are resources that can be used better and Operation Center was proved successful and more could be done.

Planning Department

The planning team was newly created at the end of year 2002 out of the old Production and Planning department. All of them were hard working but weak prevention system for documentation problems.

Production Department

The production department was created at the end of year 2002; one expat came on board as a new Head of Production manager. His team totaling 15 has place for 4

production managers, 2 Technicians and 6 Quality Auditors and one assistant in department.

Administration Department

The office management team has 9 staffs of one manager, one IT, two accountants, one assistant office manager, one tea lady, one reception and two drivers. At first glance this is a large team for this size of office. Also, overtime, some functions normally done by administration were pushed out to assistants of other departments. As reviewed by management, this department is still overstaffed but opportunities can be efficient office management and administration can give strong support to the whole Liaison Office. It might be possible that change of responsibility will probably be met by strong resistance.

3.2 Current Situation review

Since the merge of Adidas International Asia Pacific and Adidas America in 1998, the exporting volume of Adidas has grown from 4 to almost 20 million units per year. As a result of the increase of exporting volume, it requires Adidas to recruit more employees between the years 1999 to 2004.

In 1999, however, half of the number of staffs was forty percent reduced as Footwear division was closed; therefore, half of the office space has not been utilized as a working area. All office hardware and supplies were sold except computers. The computer was unplugged and kept in one corner of the Floor. Footwear manager rooms became an apparel stock inventory. A number of racks for hanging garment sample are settled in one empty area.

In addition with, Adidas corporate policy in shifting people to the factory, the number of employees in the office was reduced from 63 to 48. As a result, the working space and office hardware is over the number of staffs in the office.

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Development department review

The development process of Sportswear product started from Development department, when designer has created styling to be the real garment; then it has to be created and searched for compatible material to those styles simultaneously. When product was designed, it will be transformed to document paper, preparing to input detail of garments and other necessary descriptions for production. During the development process, there are several communications between Development team at head office and Production development team to exchange information and to ensure that products (garment) is developed correctly to be ready for mass production.

Table 3.2. Example of development timeline from third quarter of year 2004.

Activity	Third Quarter of season
	Regular Track
Article Description Release & Porto's	
A/D Release	4 Jun 04
PPR (1st Proto) sent	25 Jun 04
Yields information to LO	2 Jul 04
PPR (1st Proto) comment	3 Aug 04
Fabric Download	
Fabric Download - color for samples	17 Apr 04
Fabric Download - color Presale samples	27 Jul 04
Fabric finalized & approved/tested; The *cutoff date list (article base) will be provided separately.*	-
Embroidery/Prints - finalized/tested	-
Samples	
RMM sample order placement	28 Jul 04
Salesman samples 1 order placement	13 Aug 04
Salesman sample delivery ex. factory	18 Oct 04
Production	
Production A/D released	will provide style by style
AD update (adidas Internal USE)	
Size sets sent to Garment Technicians	
Size sets approved	Before shipment date 80 days
Pre-Production samples sent to LO/ QA	

At the same time, there are samples produced and sent from garment suppliers through the LO development team to development department at headquarter. Suppose

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that 5 times samples have been sent during development process. One of all 5 samples

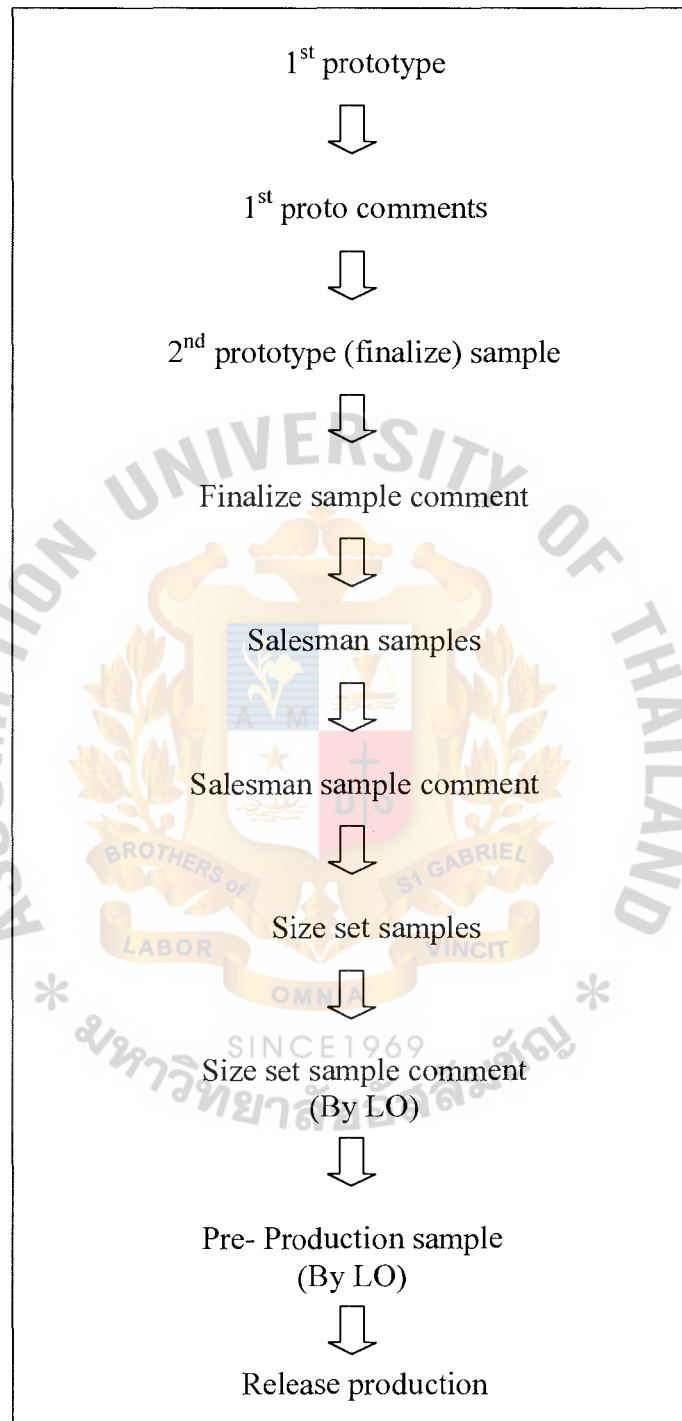is to be presented to customers to make forecast of coming order.

Figure 3.2.   Development sample process.

The reason to request several times of samples is to ensure those garments which need to be produced for further mass production is correct on what customer needs and achieve Adidas standards and requirement.

Product development samples

In between development periods the garment samples are always produced in 3 sets; one set kept at suppliers, one set is sent to development team at headquarters and another set is kept at liaison office. These are samples which are produced during development time

(1) *Prototype (1ˢᵗ generation) samples*; all samples produced are based upon an article description and basic pattern model. These are drawn up by development department at head quarters. Although all components of a garment may not be available at any time, the substitute materials or components must resemble the specified one as much as possible.

(2) *2ⁿᵈ Prototype sample*, the 2ⁿᵈ sample is the final stages of prototype sample are based on the revised article description, comment and pattern. These have to be released by development HQ team.

(3) *Salesman samples*; the samples production is based upon the final article description which contain all amendments done by the headquarter development after pricing. The salesman sample is sent in two shipments which are referred to as the early sample shipment and bulk salesman sample shipment.

(4) *Size set samples*; before bulk production starts the nominated garment maker provides the respective liaison office with the size set samples and artwork for approval. These have to be checked against the following criteria which are highlighted in the respective article description of

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measurement, fitting test and workmanship. At least 4 sizes for one style is requested to grade size and make garment to measure specs.

(5) *Pre-production sample*; it is the last development step which are manufactured in the correct material specified for bulk production. All others components and accessories must also be genuine. Pre production is used internally and requested by liaison office to distribute to LO Production team for reference when is comes to production

Documentary

Documents which need to be used for production are called, *Article Description*. It is important for development and supplier to have the same understanding level; then document that is printed out and sent to every party can represent the needs of buyer to vender well.

Document is sent to vendor; prior samples are produced every step of development process. Document is always developed, edited and revised continuously until Finalize development period and becoming production.

Estimation on paper usage for one garment, number of pages of one article is around 25 pages/ styles to describe:-

(1) Sketch design

(2) Material used

(3) Color combination of one garments or *"colorway"* or number of article

(4) Workmanship

(5) Material information sheet, Material specification

(6) Care label and care instruction,

(7) Labeling and packaging

(8) Size specs and spec sheet

(9) Etc.

Table 3.3. Development timeline to submit document to suppliers.

Activity	Third Quarter of season	No. of document
	Regular Track	
Article Description Release & Porto's		
A/D Release	4 Jun 04	**1**
PPR (1st Proto) sent	25 Jun 04	
Yields information to LO	2 Jul 04	
PPR (1st Proto) comment	3 Aug 04	**2**
Fabric Download		
Fabric Download - color for samples	17 Apr 04	**3**
Fabric Download - color Presale samples	27 Jul 04	
	-	
Fabric finalized & approved/tested *The cutoff date list (article base) will be provided separately.*	-	
Embroidery/Prints - finalized/tested	-	
Samples		
RMM sample order placement	28 Jul 04	**4**
SMS1 order placement	13 Aug 04	
SMS1 delivery ex facty	18 Oct 04	
Production		
Production A/D released	will provide style by style	**5**
AD update (adidas Internal USE)		
Size sets sent to Garment Technicians		
Size sets approved	Before shipment date 80 days	
Pre-Production samples sent to LO/ QA		

Remark: Previous document will be replaced with an update version of itself for filing.

Number of developed style per season (6 months) from development department
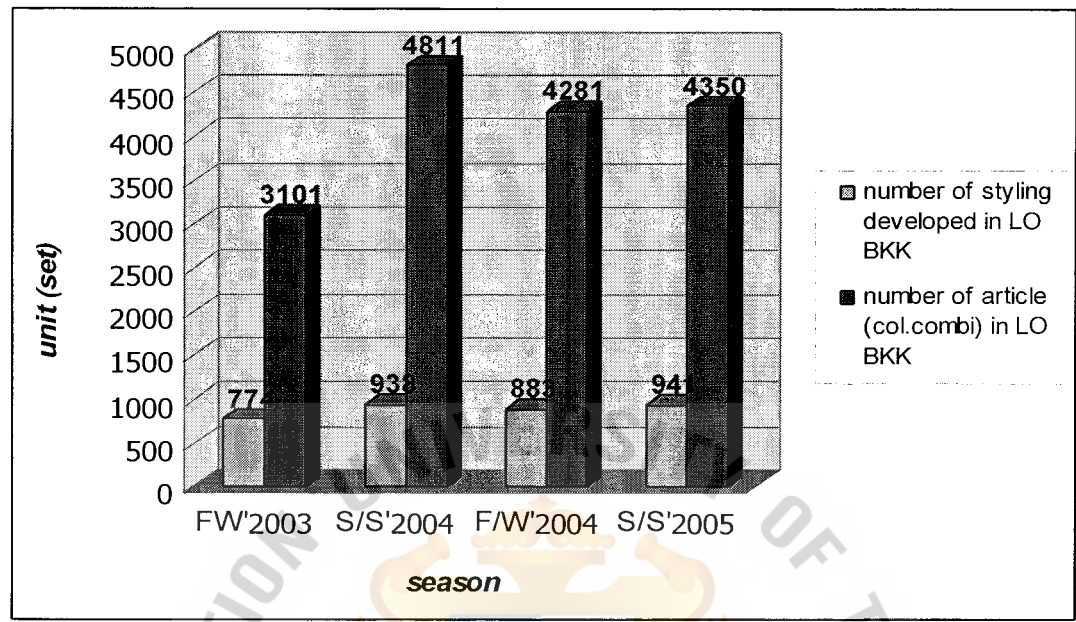
Figure 3.3. Numbers of developed style and article unit per season in LO BKK.

Production department

Overall major task of production is responsible for quality of garment production, since first material is sewn to garment until last shipment of those purchase is shipped out. In term of quality controlling system, it is necessary for department to request production sample to keep for reference. Also in regards to claim procedure which Adidas guarantee their products to consumer for reasonable damaged that happens within 24 months after production, consumer can make a claim when finding out defects to Adidas.

Production sample

(1) *Pre-production sample* after pre-production sample is inspected by Garment Technician, one set of it will be handover to LO production team as reference when it comes to production

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(2) *Shipment sample,* number of samples which is requested to keep in production department is equal to number of styling plus number of articles number (certain color ways) for one style.

(3) *Testing sample*, it is regulation for garment makers to follow the Adidas rule by making wash test garment and send to Adidas for reviewing and releasing result. The sample which has to be sent to Adidas per season is equal to number of articles (certain color ways) times two; unwashed and washed sample.

Based on information above, we can investigate within one season (6months) the samples are installed in the office are shown on number below:

Table 3.4.   Inventory Sample number in the office.

Department	Sample type	Mar-03 to Aug-03		Sept-03- Febr-04		Mar-04 to Aug-04		Sep-04 to Febr-05	
		Style	Articles	Style	Articles	Style	Articles	Style	Articles
Development	Salesman samples	-	3,101	-	4811	-	4281	-	4,350
	Size Set sample	3,096	-	3,752	-	3,532	-	3,764	-
	Pre-production sample	774	-	938	-	883	-	941	-
Production	Pre-production sample	774	-	938	-	883	-	941	-
	Shipment sample	-	3,101	-	4,811	-	4,281	-	4,350
	Wash test sample	-	6,202	-	9,622	-	4,281	-	8,700
subtotal		4,644	12,404	5,628	19,244	5,298	17,124	5,646	17,400

As above table we can easily see that sample is requested from factory to be kept in office one season or half a year of beginning of year 2004 is almost 25,000units.

Total of garment inventory per one year of 2004 that office has to absorb for its inventory space is 24,872 + 22,422= *47,294 units/ year 2004(12 months)*

A number of printed documents for supplier

The paper document is reversed way of garment sample that Liaison office has to submit hard copy of article description to supplier in return. As mentioned before there are 5 times during development which developer needs to make hard copy to suppliers. Estimation of paper usage from development area for this matter is shown in below table:-

Table 3.5. Paper usage from development process.

Season	F/W 2003	S/S 2004	F/W 2004	S/S 2005
number of developed style in LO BKK	774	938	883	941
number of pages / style by average	25	25	25	25
total paper page / time / season	19,350	23,450	22,075	23,525
printed out amount of time	5	5	5	5
total amount of paper usage /season (page)	96,750	117,250	110,375	117,625

The two facts of product samples and paper usage are shown as the waste in office operations. Product samples which need to be kept in office can create waste of usage space (inventory or warehouse) and paper usage can become a waste of office facility of paper and printer ink cartridge which we will analyze and show for the usage space and amount of money which has to be paid for paper and printer ink later on.

IV. IMPLEMENTATION AND EVALUATION

4.1 First Implementation lean by 6S and Visual workplace

The initial stage in implementing lean application in office environment is using 6S modules to establish discipline in work area.

The 6S workshop is the techniques of sort, set aside, shine, standardize and sustain. This is a specific strategy for making sustainable improvements in office operation or work place so that staffs can take the strategies back to the company and begin implementing them immediately.

6S is a key component of Lean Manufacturing and can produce dramatic, measurable results in a short period of time. The whole production and operations teams include country manager, production managers and people of Adidas Company who will benefit from 6S. It simplifies work environment, reduces waste and non-value activity while improving quality efficiency and safety.

6S's in workplace organization is a simple common sense system comprising of the following steps

4.1.1. Sort, Cleaning the areas

    (1)   Remove all unnecessary items from the workplace.

    (2)   Define what is needed to meet production goals and remove everything else.

    (3)   Key tool - Red tagging

    (4)   Item classification

        (a)   Item ID and quantity

        (b)   Reason for red tagging

        (c)   Work section

        (d)   Date

(5)   Sort standards

    (a)   What is needed and not needed

    (b)   Red tag targets

    (c)   Red tag frequency

    (d)   Red tag responsibilities

    (e)   Disposal procedures / Authority

(6)   A visible way to identify items that are not needed or in the wrong place

    (a)   Establish the rules

    (b)   Identify unneeded, misplaces items

    (c)   Attached red tags

    (d)   Move identified items to holding area

    (e)   Red tag safety problems

    (f)   Dispose of truly unneeded items

(7)   Red - Tag Holding areas

    (a)   Are used for temporary storage

    (b)   Should be in a location nearby

    (c)   Needs someone to be responsible for it

    (d)   Need to be cleared out often → weekly, monthly

    (e)   Should be highly visible

    (f)   Should be centrally located

    (g)   Should clearly identified

    (h)   Should have a clear disposal procedure

The following are the pictures of garment technician work area *before* and *after* implementing 6S. Garment Technician has to conduct check specs and inspect sample. At least 4 sizes of one set of sample must be performed.
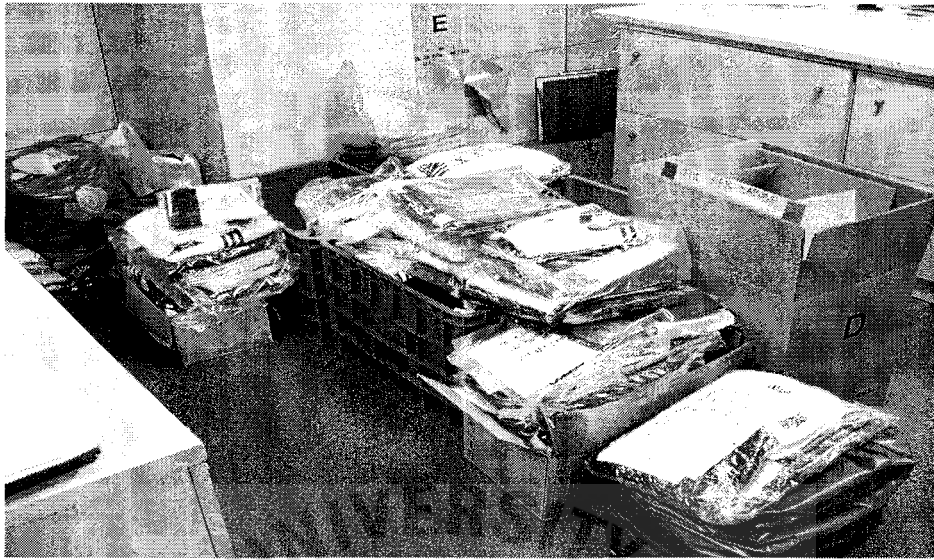
Before

Figure 4.1.   Before implementing 6S from garment technician work area.

After

Figure 4.2.   After implementing 6S activities at garment technician work area.

4.1.2. Set-in-Order Designated Locations. Organize what's left to minimize wasted motion.

 (1) Considerations for establishing locations for storing items include: storage rational, storage options, location-specific tips, using signs & labels, & documenting the plan are all covered.

 (2) Develop color code/ color standard for visual control, Objective for setting up location should be clear that:-

  (a) Anyone can find anything at any time

  (b) Out of standard are obvious to everyone

  (c) Identify confidential information

These pictures have other areas of implementing 6S in office environment of development department. These samples are Salesman Samples of Development department which needs to be kept for quoting price and to be handed over to supplier and Quality auditor as reference.

After 6S activity, samples are tagged and hangtag to show ID season and its category on each rack for easy classification.

Before

Figure 4.3.   Before implementing 6S in Development area.

After

Figure 4.4.   After implementing 6S in Development area.

4.1.3. Shine and Inspect, Cleanliness and Workplace appearance. Make cleaning a part of everyday work getting the workplace clean, maintaining its appearance, and using preventive measures to keep it clean

    (1)   Clean everything

    (2)   Eliminate all source of contamination

    (3)   Find ways to keep the workplace clean

    (4)   Adopt cleaning as a form of inspection

    (5)   Make clean a part of everyday work

The 6S team must decide:-

    (1)   What to clean (target)

    (2)   How to clean (methods)

    (3)   Who will do the cleaning

    (4)   How clean is clean

Another activities picture from the workplace after 6S implemented

Before

Figure 4.5.   Before implement 6S at work area.

After
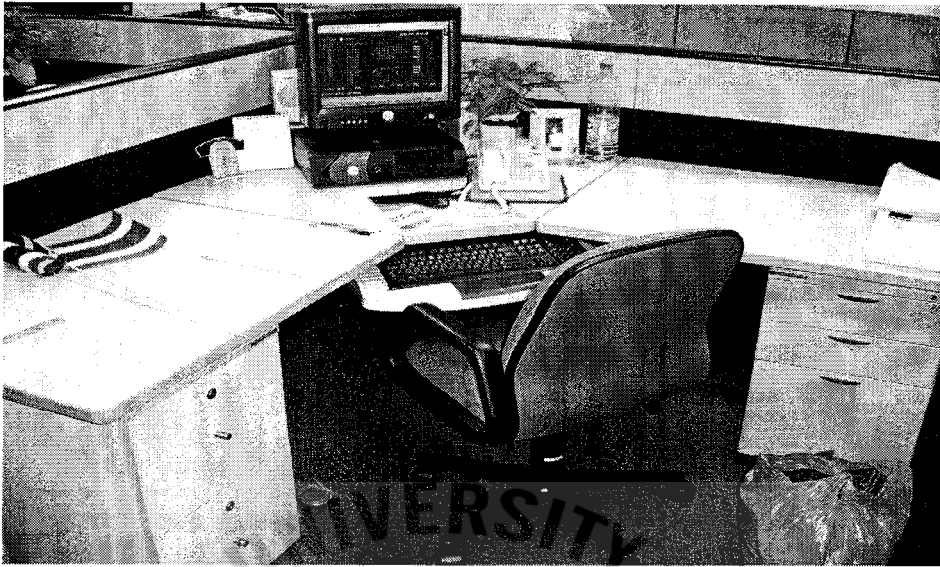
Figure 4.6.   After 6S Activity has been implemented at work area.

(1)   The key to implement is

   (a)   To develop check sheets outlining what should be cleaned.   Be as

        specific as you can

   (b) Team member must be trained to solve root cause of cleanliness

        problems.

4.1.4.   Standardize

(1)   Create the rules by which the first 3 Ss will be implemented and maintained.

      SOPs, Standard Of Procedures.

(2)   As agreed by 6S team members and compared with other successful

      organizations, these are the basic rules for 6S Activities

(a) Employees should clean up their work area every evening before leaving.

(b) At 4.30 pm Friday, 6S member will scan and check employee's area with a provided checklist sheet.

(c) Every 3 months, Inventory and warehouse must be cleaned up and checked in order.

4.1.5. Sustain

(1) Keep it going!

(2) Practice, practice, practice.

(3) Self discipline, it is important to implement lean and 5S activity so that all employees must understand what they must do and cooperate into reaching target of implementing the 6S activity. The best approach is to set up training before kicking off lean project to all level of employees.

How to make the 5S sustainable and be standardized, we create workplace scan checklist for 6S team member as a tool to evaluate 6S activity as the following table.

(1) Educate everyone in 6S

(2) Inspect their own workplace daily

(3) Continuously improve

Table 4.1. Workplace scan checklist.

Workplace Scan Diagnostic Checklist		Number of Problems	Rating Level
		5 or More	Level - 0
		3 or 4	Level - 1
		2	Level - 2
		1	Level - 3
		None	Level - 4

Category	Item / Total Score	Date Rated					
		0	0	0	0	0	0
Sort (Organization)	**Distinguish between what is needed and not needed**						
	Unneeded equipment, tools, furniture, etc. are present						
	Unneeded items are on walls, bulletin boards, etc.						
	Items are present in aisles, stairways, corners, etc.						
	Unneeded inventory, supplies, parts, or materials are present						
	Safety hazards (water, oil, chemical, machines) exist						
Set in Order (Organization)	**A Place for everything and everything in it's place**						
	Correct places for items are not obvious						
	Items are not in their correct places						
	Aisles, workstations, equipment locations are not indicated.						
	Items are not put away immediately after use						
	Height and quantity limits are not obvious						
Shine (cleanliness)	**Cleaning and looking for ways to keep it clean organized**						
	Floors, walls, stairs, and surfaces are not free of dirt, oil, grease.						
	Equipment is not kept clean and free of dirt, oil and grease.						
	Cleaning materials are not easily accessible						
	Lines, labels, signs, etc. are not clean an unbroken						
	Other cleaning problems (of any kind) are present.						
Standardize (adherence)	**Maintain and Monitor the first 3 categories**						
	Necessary information is not visible						
	All standards are not known and visible.						
	Checklists do no exist for all cleaning and maintenance jobs.						
	All quantities and limits are not easily recognizable						
	How many items can not be located in 30 seconds?						
Sustain (self discipline)	**Stick to the rules**						
	How many workers have not had 5S training?						
	How many times, last week, was daily 5S not performed?						
	Number of times that personal belongings are not neatly stored						
	Number of times job aids are not available or up to date						
	Number of times, last week, daily 5S inspections were not performed						
Safety (self discipline)	**Stick to the SOE Policy**						
	How many workers have not had SOE training?						
	How many injuries have you had this year in the workplace?						
	Are all safety exits marked and clearly understood by the workforce?						
	How many hazards or danger areas do you have unmarked?						
	How many SOE corrected actions remain to be completed?						
	Is SOE policy posted and visible in the workplace? Local Language?						

4.1.6. Safety

(1)   No change should be made that would jeopardize safety.

(2)   Everyone should be empowered to stop the process if any safety risk is present.

(3)   Never jeopardize anyone, follow the SOE Guideline

4.2   Share information, behind the 6S

Finishing 6S process, it is found that there is no enough room to set everything in order, standardize and sustain the standard operation procedure, and save the company from losing indispensable information and product samples in the future. As a result, the company needs to employ other modules of lean application to eliminate the existing waste.

Figure 4.7.   Behind the 6S.

After implemented lean and some stuff can't define its place

Figure 4.8.   Behind the 6S, Samples which can't be placed after lean due to warehouse is full.

It is interesting why the 6S cannot be successful for implementation in such a simple office operation. The other module of lean then can be stepped into this 2nd step in order to find out the root cause of it.

The picture below shows some problems and causes of waste which happens in office that is evaluated by *Cause-Effect Diagram*
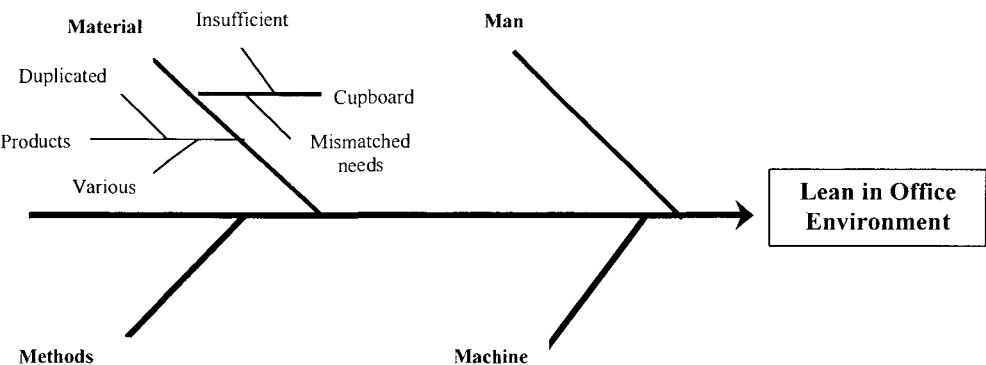

Figure 4.8.   Analyzing problem areas in office environment by Cause - Effect Diagram

4.3 Resolve problem area with Kaizen module

4.3.1 Identify the Project

There are two criteria of failure of cleaning working area;

   (1) There are a great number of product samples kept in the office

   (2) Container (Cupboard) figure is not matched for keeping sample that is
        garment but document.

In order to understand the root cause of problem or actual waste, we should get to
the bottom of these two criteria.

   (1) A great number of product samples, Eliminate or reduce number of product
        samples is result not to change the container (cupboard) that means that we
        don't need to invest more money.

   (2) Cupboard

   (a) Changing / increasing number container figure is result to capital
        investment then it is not in accordance with the target of lean.

   (b) After changed or increased container, it can never be ending of
        increasing volume as we corrected at the end of problem not fixing the
        root cause

4.3.2 Select leader and team

        Whereas the problem occurred, the Production and Development department, the
team should consist of these two departments

Team leader: Production or Developer

Member: Production team/ Development team

               Head of Production Department and Head of Development department as

               a consultant

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Before we start to implement Lean we should understand areas where we can improve our project by identifying the activity or problems to be 3 groups;

      (a) **A Action**; activity or problem that can be implemented by the team themselves

      (b) **B Action**; activities or problem that can only be implemented together with other teams

      (c) **C Action;** activities or problems that can only be implemented with the consent of top management.

(1)   Basic rules

The following basic rules are to be considered in relation to Lean activities:

      (a)   Time spent on the work to implement lean is considered working time

      (b)   The groups who suggests a lean activity is also responsible for its implementation.

      (c)   In case of A, -Activities, the department head takes care of the eventual budget for their implementation.

      (d)   For B and C-Activities, senior management takes care of the budget.

      (e)   The refusal of a team members initiative by the board or by senior management will be explained within two weeks after the proposal is submitted. The explanations is presented in the steering committee and forwarded to the lean team.

(2)   Principles for Problem/ activity selection

The selection of activities should be based on a combination of two or more of the following criteria:

      (a)   The problems/ activities lead to a direct improvement of cooperation and or internal/ external processes.

    (b)   The activities lead to financially measurable results.

    (c)   There is a high internal / external customer benefit from the activities.

    (d)   A majority of the lean team members have a fundamental interest in the activity or that problem.

    (e)   A direct reference to the company goal is visible.

The activities / problems should not, however;

    (a)   Include self-evident matters

    (b)   Have considerable impact on the corporate investment plan (e.g. moving headquarters, proposing merger, etc)

(3)   Documentation

    (a)   Documentation of lean teams should be provided as follows:

    (b)   A brief must be provided after each team members meeting.

    (c)   In department area, a visualization of team results should be posted so that all colleagues can track progress.

(4)   The role of the lean team

    (a)   The lean team members should:

    (b)   Bring in their expertise on content and processes

    (c)   Be accountable for the team's results.

    (d)   Be responsible to implement the agreed actions

    (e)   Responsible to attend and contribute on a regular basis.

(5)   The role of the management

    (a)   Managers should show passion and full commitment for lean implementation.

    (b)   Make sure that the lean team meetings take place

    (c)   Support change agents

(d)   Receive action plans

(e)   Provide some budget where needed.

(f)   And empower their employees to change things.

(g)   Monitor and take care of the team and activities

(h)   Help to overcome problems or blockades

The composition of the groups is not subject to rigid regulation. If necessary, also externals (e.g. managers or employees) can be invited to a team.

Selection team members will depends on the problem areas that we select to implement. In principle, a group consists of no more than 20 participants.

The frequency of the group meetings is basically not subject to fixed regimentation. It is planned by the group themselves. However, a meeting of the teams should take place at least once a month. It should not be longer than two hours.

The respective managers should be informed before and after each meeting about topics and results (to be decided within each member)

4.3.3 Objective to continuous improvement team

(1)   Eliminate unnecessarily keeping samples in the office area

(2)   Eliminate waste of paper and office facility used.

4.3.4 Baseline of current situation and develop idea for improvement

Problem area 1: a great number of keeping sample in office

A result of keeping samples for both departments is shown in the figure below:-

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Table 4.2.   Number of keeping sample in office.

Department	Sample type	FW 2003 Mar-03 to Aug-03		S/S 2004 Sept-03- Febr-04		FW 2004 Mar-04 to Aug-04		S/S 2005 Sep-04 to Febr-05	
		Style	Articles	Style	Articles	Style	Articles	Style	Articles
Development Unit		774	3,101	938	4,811	883	4,281	941	4,350
Development	Salesman samples	-	3,101	-	4,811	-	4,281	-	4,350
	Size Set sample	3,096	-	3,752	-	3,532	-	3,764	-
	Pre-production sample	774	-	938	-	883	-	941	-
Production	Pre-production sample	774	-	938	-	883	-	941	-
	Shipment sample	-	3,101	-	4,811	-	4,281	-	4,350
	Wash test sample	-	6,202	-	9,622	-	4,281	-	8,700
subtotal		4,644	12,404	5,628	19,244	5,298	17,124	5,646	17,400
Grand total volume samples				24,872		22,422		23,046	

Suppose that one shell in cupboard can contain 24 pieces of garments; one cupboard can contain 48 samples on average.

Calculate from volume of samples in season FW'2003,

It is required to have 355 cupboards in the office;

(1)   145 cupboards for Development

(2)   210 cupboards for Production department for keeping samples.

In reality, Developer and Production staffs who work in the office can only have 4 cupboards for each and inventory shared together.

Total number of cupboard in office is (17+9) x 4 = 104 cases.

Number of samples that can be kept in cupboard on average is 4,992 (104 x 48) unit

Where is the rest of 12,056 pieces?

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The rest of garments are kept in carton boxes and stored up at corner spaces and some in the warehouse. When the production season is gone, the entire sample will be moved to the rental outside warehouse.

How can we handle this situation?

It might be possible that the entire sample during development and production are overlapped, it is important for us to review the key point of requesting these entire samples to be kept in the office.

These below figure are the actual statement of current work in the office; sample

Table 4.3. Sample requested by adidas office.

No.	Sample	Request by	number request	Status of Material	Purpose of sample
1	1st Prototype samples	handover to headquarter	one set /style	Substitute	Initial sample
2	2nd Prototype Samples	handover to headquarter	one set /style	Substitute	Finalize of revise and change pattern
3	Salesman Sample	LO Developer	all article/style	Substitute	Final article description and for pricing
4	Size Set Samples	LO Garment Technician	4 size/ style	Substitute	check size specs and accessory
5	Pre-Production Sample	- LO Garment Technician - LO Production Team	2 sets/style	Actual	- Confirm with actual material, prepare for bulk production and handover 1 set to production for being reference when it produces to production
6	Shipment sample	LO Production Team	1set/ style	Actual	Being reference for inspected goods after release shipment
7	Wash Test Sample	LO Production Team	2 sets/style	Actual	Being reference for shipment released in term of quality after be washed

It is challenged to propose a minimized number of samples requested by the following:-

Current

Table 4.4.   An existing number of keeping sample.

No.	Sample	Responsible by	Season FW'2003	Season SS'2004	Season FW'2004	Season SS'2005
1	1st Prototype samples	handover to headquarter	-	-	-	-
2	2nd Prototype Samples	handover to headquarter	-	-	-	-
3	Salesman Sample	LO Developer	3101	4811	4281	4350
4	Size Set Samples	LO Garment Technician	3096	3752	3532	3764
5	Pre-Production Sample	- LO Garment Technician - LO Production Team	1548	1876	1766	1882
6	Shipment sample	LO Production Team	3101	4811	4281	4350
7	Wash Test Sample	LO Production Team	6202	9622	8562	8700
		Total	17048	24872	22422	23046

Challenge

Table 4.5.   Comparison number of sample reduced.

No.	Sample	Responsible by	Season FW'2003	Season SS'2004	Season FW'2004	Season SS'2005
1	1st Prototype samples	handover to headquarter	-	-	-	-
2	2nd Prototype Samples	handover to headquarter	-	-	-	-
3	Salesman Sample	LO Developer	3101	4811	4281	4350
4	Size Set Samples	LO Garment Technician	2319	2814	2649	2823
5	Pre-Production Sample	- LO Garment Technician - LO Production Team	774	938	883	941
6	Shipment sample	LO Production Team	-	-	-	-
7	Wash Test Sample	LO Production Team	6202	9622	8562	8700
		Total	12396	18185	16375	16814
		Differ	- 4,652	- 6,687	- 6,047	- 6,232

Where do the reduced numbers come from?

(1)   *Size set samples* is reduced from 4 sizes per style to be 3 sizes per style,

Reason: Grading machine can grade size correctly even if it is only input 3 size

spec data.

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When size set sample is being inspected; the 4th size is requested for double standard then S, M and L is enough to guarantee size spec grading accuracy.

(2)   Pro-Production Sample is reduced from 2 Set*s* to be 1 Set.

Reason: - All pre-production samples are inspected by garment technician before release for bulk production. When garment maker submits 2 samples to Garment Technician, it always measured only 1 size and compared to another with visual viewing without measuring again.

- When product is declared to Production Status, the responsibility of Garment Technician is done and over. Pre-Production sample is always ignored and only kept in store or packed in box.

Then it is reasonable to reduce pre-production to be 1 set. After garment is measured and checked by Garment Technician, it should be handed over to Production Team.

(3)   *Shipment Sample*,

Reason   There are two activities that happened before release of shipment, one wash test must be done and presented to LO production team to review by comparing the washed sample to Unwashed sample for its appearance, second is LO Production team must inspect shipment and take one sample for reference.

We can eliminate this duplicate sample by using the unwashed sample to represent Shipment sample at the same time.

Problem area 2: Paper usage voluminous during Develop process

Parallel to the sample and development process, the document paper is necessary to consider if it is a waste of money?

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Target:

    (1)   To reduce unnecessary cost on providing the hard copy of article description to suppliers in terms of printing materials (papers) and printer inks.

    (2)   To eliminate waste of time in document sending process.

    (3)   To eliminate waste of office space to keep document filing.

    (4)   Within the supplier organization, they also can transfer data to another section via email as well as Adidas send to suppliers.

Cause of problem:

As shown on previous chapter that Article Description (AD) has to be sent a total 5 times to supplier prior product sample is produced to update description and confirmed for production reference.

Why does it have to be hard copy in paper to supplier?

Data and information (Article description) if we send the description with the Soft file, the content of soft file is editable or changed by the receiver (suppliers). This might affect the standard quality of Article Description (AD) we set for the suppliers. Therefore, it might cause the claiming problem in the future. That is the reason why the company has to send the article description in the form of hard copy to suppliers.

Possible Solution:

As this work process has been done for a long time and before emerging of Adobe Acrobat program, would that be making sense to install acrobat writer?

Based on development timeline, company sent Hard copy of AD to supplier 5 times, there are 25 pages per one AD. As a result, company spent 125 paper pages to finalize the AD before starting production process. Based on volume of developed style per season, a great deal of papers is wasted by sending AD to suppliers.

Table 4.6. Amount of paper used per season to submit to supplier.

Season	F/W 2003	S/S 2004	F/W 2004	S/S 2005
Developed style number in LO BKK	774	938	883	941
Number of pages / style by average	25	25	25	25
Total paper page / time / season	19,350	23,450	22,075	23,525
Printed out amount of time	5	5	5	5
Total amount of paper usage /season (page)	**96,750**	**117,250**	**110,375**	**117,625**

Based on information of paper usage, we spent money for hard copy to supplier in total

The cost of paper per 500 pages (1 ream) is 103 baht*

The printer ink used for printing paper 9,000 pages /1cartridge**

The cost of printer ink 1 cartridge is 4,000 baht

Remark1:- * Paper price values based on information from quality of paper 80 grams from "*Double A Delivery company*"

Remark 2:- ** Printer ink cartridge information based on HP Laser jet printer.

Table 4.7. Amount of hard copy usage in office to suppliers.

Season	F/W 2003	S/S 2004	F/W 2004	S/S 2005
Developed style number in LO BKK	774	938	883	941
Number of pages / style by average	25	25	25	25
Total paper page / time / season	19,350	23,450	22,075	23,525
Printed out amount of time	5	5	5	5
Amount of paper usage /season (page)	**96,750**	**117,250**	**110,375**	**117,625**
Paper usage in ream (500 page)	193.50	234.50	220.75	235.25
Price per ream(baht)	103	103	103	103
Amount of paper used/ season (baht)	**19,930.50**	**24,153.50**	**22,737.25**	**24,230.75**
Printer ink used 9,000 pages/1Cartridge	10.75	13.03	12.26	13.07
Ink cartridge used (4000bht/cartridge)	**43,000.00**	**52,111.11**	**49,055.56**	**52,277.78**
Total amount of money spent / season (baht)	**62,930.50**	**76,264.61**	**71,792.81**	**76,508.53**

As we can see from amount of money wasted per semi-annually, there are also many times that the company has to send AD to suppliers via facsimile process in urgent cases. Although the company uses fax machine, however, the AD with signature has to be sent to suppliers the following day. This is another hidden cost the company has to pay.

As a result, we begin our lean journey in the office with information technology system change notices.

Challenge to paperless solution

Adobe Acrobat 6.0 Professional English IE CD 1 user   12,900 baht*

Lite-On CD Writer LTR-52327S   1,200baht**

Number of Developers are 14 hence, the price of first cost for Acrobat installation is about 12,900 x 14 = 180,600 baht.

Remark: *, ** price is based on PRN plus Co., Ltd. IT Mall, Fortune Ratchada.

As the acrobat program is not required as recurring cost, an update version or upgrade can be installed via internet without adding cost.

CD Writer to burn data stored in computer

Concerning paperless solution, it created another task for employees to store data or AD after transformed to acrobat file. Apparently, Development department can have their own public directory in K Directory which has memory space around 10GB. Once AD or data has been transformed to acrobat file, it will be stored into this shared drive and middle manager will review and arrange it into CD. Number of middle manager level in development that is four people who can have CD writer.

Lite-On CD Writer 1,200 x 4 is   4,800 Baht

One AD is used for memory by average   630KB

One CD (700MB) can collect AD data   1,056 files or 1,056 styles

1CD RW Price value is   100 baht

Suppose that Data will burn in CD one time / period of sending AD to supplier then only 5 CD is being used per season as long as development style is not more than 1056 styles per season.

After 4 seasons or 2 years, CD can be replaced with new data or rewritable.

Table 4.8. Comparison price of existing paper print with paperless solution.

Season Development Method	F/W 2003 April	S/S 2004 Oct	F/W 2004 March - Augus	S/S 2005 Sept - Feb
Amount of paper print / season (baht)	**62,930.50**	**76,264.61**	**71,792.81**	**76,508.53**
Cumulative paper print (baht)	62,930.50	139,195.11	210,987.92	287,496.44
Total cost of Paperless (baht)	185,900	500	500	500
Cumulative paperless solution (baht)	185,900	186,400	186,900	187,400

It is noticeable that sends and receives emailing costs are not included in these paperless prices, after calculation the total volume of this matter, its pricing is too little to impact on the decision made for this solution then it can be skipped for calculation.

Within 2 and a half season or about 15 months of development period the First cost of installation Acrobat program can cover up the usage of paper and ink amount.

Table 4.9. Return of Investment for acrobat program.
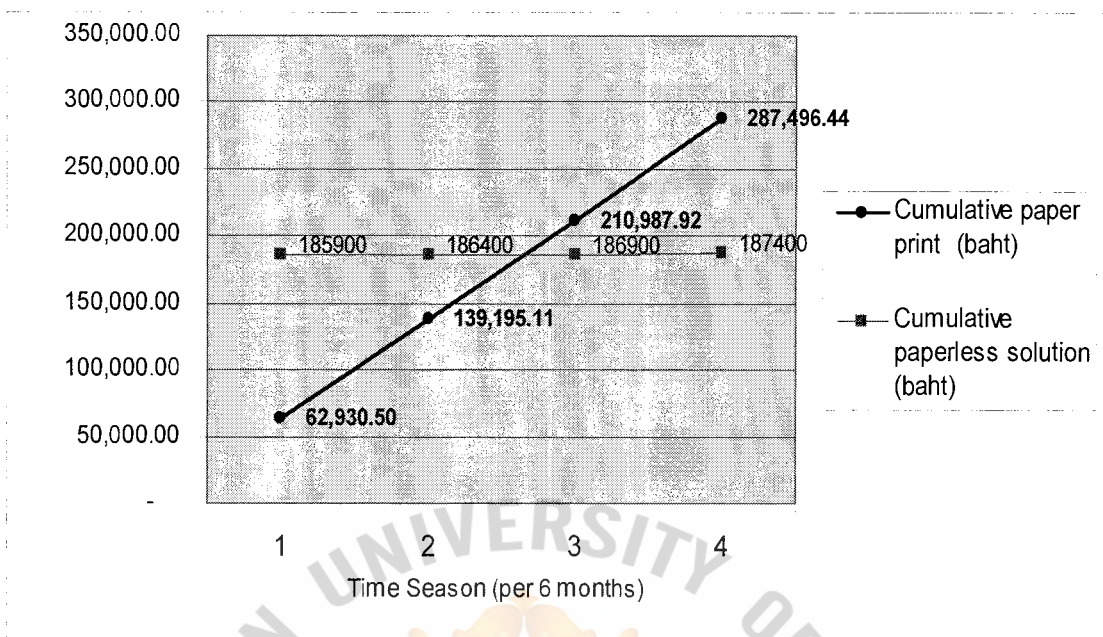
Recommendation: Middle manager should review data storage in shared server every two weeks or bi-monthly and only middle manager can be authorized to delete data or Acrobat file after burn in CD.

V. CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Lean manufacturing was adopted in industry world by Toyota manufacturing company, lean manufacturing concept is based on concept of quality improvement of William Edward Deming. Lean in assembly manufacturing plant tends to focus on one-piece flow. In process or job shop it tends to focus on eliminating wait time. The idea of eliminating wait time and standard work also applied to the office and administrative environments.

Lean concepts tend to eliminate waste in manufacturing or in organization; the benefits of lean can be reviewed as follows:

(1) Lean provides tools for analyzing process flow and delay times at each activity in a process

(2) Lean centers on the separation of value adding from non-value adding work with tools to eliminate the root causes of non value adding activities and their costs

(3) Lean provides a meaningful quantifying and eliminating of the cost of complexity

Typical waste on the administrative side falls into categories like

(1) Analysis paralysis; in the factory this look like delays.

(2) Unnecessary approvals; this is another form of delays or wastes.

(3) Excessive rework; never time to do it right

Principles of Lean Applications in office environment are

(1) A competitive advantage strategy using proven system accelerated improvement plan.

(2) A progressive identification and elimination of all non value added wastes.

(3) A visual system, easy to "see" problem

(4) Achieved and sustained through the involvement of employees at all levels.

(5) A training tool which teaches participants how to implement as well as plan for continuous improvement

Adidas Company has established Lean manufacturing system for their supply chain partnership in order to get a greater number of outputs and encourage the business partnership to be stronger and synchronized achievements in terms of demand planning, purchasing, production execution but adidas themselves seem to have forgotten improving their internal organization. Whereas Adidas suppliers invest on an automatic computer program to improve their accountability on their production performance and communication between their production line factory and their head office, Adidas is still making hard copy for distributing.

Based on lean concepts, researcher provides some techniques and develops 2 ideas of possible solution to eliminate two wastes material usage in office.

(1) Reduce number of samples produced for Adidas

(2) Eliminate waste of office facility and waiting time to deliver documents to their suppliers.

5.2 Recommendation

By only initiating these two improvement areas, Adidas can save costs of office facility usage and decrease the amount of work in processes.

After learning and experience of lean concepts, it is obviously visible that there are numerous wastes still left in the office area.

It is recommended for everyone to keep on improved workplace continuously. As mentioned on the current situation in the office on previous chapters that some work

space are not utilized as it is, some activities of employee still lack knowledge to initiate lean and improve on their own. In order to maintain the spirit of continuous improvement and accomplish the goals of lean implementation, certain guidelines and knowledge bases are necessary.

A-Activity where employees can analyze their own current job done, if there's anything is wasted in their work, get rid off it.

B-Activity; set up lean members to scan their work which is coordinated together, find out some waste and root cause of it in order to get faster speed of job together.

C- Activity, it is important for project that Top management should support and provide some budget if needed.

All the continuous improvement can only be accomplished by empowering and involving all colleagues of company to maximize efficiency on the job, improve service orientation to internal and external customers. Last is to encourage entrepreneurial spirit in all colleagues.

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