

LEAN CONSTRUCTION MANAGEMENT OF BPIMT(BUILDING-CONSTRUCTION PROCESS INNOVATION MANAGEMENT TOOLS & TECHNIQUES) THAT BASED VSM & TACT

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ABSTRACT : Proving the effect of lean construction has yet to be done for its staying poor basic building though there has been efforts and wants to introduce the theory and concept of lean construction in practical site.

Therefore, we need to specify the methods of productivity improvement and construction process through various adaptations in the site. Also, to apply such improvement methods systematically, we need active participation of owners, contractors and supply chain members in relation to construction industry and are also require appropriate methods to adapt.

At first, this study thinks over the techniques of lean construction that has been verified through studies carried before. For second, it selects the technique of lean construction with the practicality in the construction site. For third, it is aimed to make a manual of lean process management by the use of TACT and V.S.M. For fifth, it will show the method of management for repeated activity and develop a guide-line and procedure that applies the concept of work sequence and resource equalization to each phase of process management. At last, it will show methods of reflecting V.S.M. to improve and grasp the waste factor from the step of managing an activity process and develop the form to analyze the waste in construction site by mapping the value flow.

Key words : Lean Construction, BPIMT(Building-construction Process Innovation Management Tools & Techniques), VSM(Value Stream Mapping), TACT Management

1. INTRODUCTION

1.1 Background & Purpose of the Study

Management can be specified in 4 types, Process management, Construction expenses, Quality management, and safety supervision. Among them, Process management is the most base, and important management element. If the process management is unsuitable it results lack of absolute work period, delay in construction, and waste in resources, etc, causing quality deterioration and expense augmentation. Previous process management manages the construction consequently, only by the results in time, expense, and progress rate. But this doesn't consider the possible variation. So it may be possible to manage the time by establishing a plan for a long period, but there are limits in detailed process plans for workers which can cause unbalance of process management.

To solve the unbalance and increase the efficiency through organized cooperation with other companies, the necessity of a newly process innovation management tools and techniques which can elevate the trust of the process plan

and keep the stability of the process, is essential. Therefore, our study recommends innovative process management tools to demolish the waste factor of process management and to get continuance in work period by using "Lean Construction" theory. The general idea of the currant process management and the process innovation management is shown in Figure.1 below.

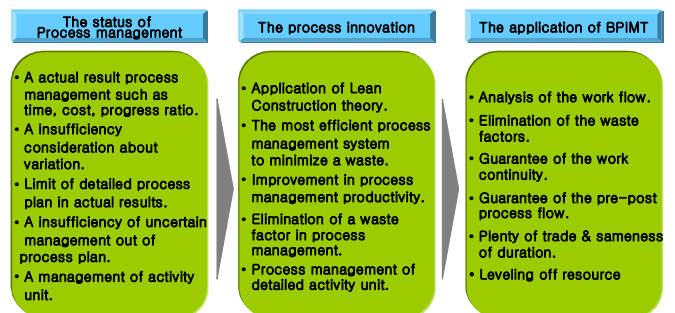


Figure 1.The status of process management & the concept of BPIMT

1.2 Boundary and the Method of the Study

First, to develop a BPIMT for the application in the field we analyzed the techniques of lean construction(VSM, TACT, Last Planner System, Poka-Yoke, Just-In-Time, Kanban, Pull System, PPC, etc.) that has been verified through studies carried before and selected VSM, TACT system, which comprehends the concept of all technique of lean construction, and which also has been a case in adoption in domestic field, to reform not only a specific stage but all of the process management.

Also we developed the process and the method of BPIMT usable for the field managers. For it, we developed a manual and presented sequence/standard/ regulation/form to support an efficient process management which applies VSM that verifies and removes the waste element

2. CONSIDERATION IN CONSIDERATION

2.1 Current States of Construction Process Management

In Current state of process management, the cooperation don't consider the following activity and only proceed it on the period of their convenience. This disconnects the flow of the work in between activities causing unnecessary waiting period and over time, discontinuance in work resulting delay in construction and increase in cost.

2.2 Lean Construction & Techniques

"Lean construction" is a compound word of Lean and Construction which means "the most efficient construction production system with minimum waste", the basic principle of this system comes from Lean Production System, LPS. In the Book "Lean Thinking"(1996), it is said that it is called lean because lean thinking offers a method for a company to use the least time and price with least equipment and space with little manpower and effort to give what the client wants more precisely and more closely.

Also "Lean" was defined as an establishment of a perfect process with continuous improvement process through flow production and pull production, embodying the value is by 7 types of definition, and analyzing the value flow to minimize the none-value adding activity immanent in process.

Table 1. Non-Value adding Activity of Lean Production

Non-Value adding Activity	Substance
Defect	Repair of Rework
Overproduction	Producing more than is needed before it is needed
Inventory	Maintaining excess inventory or raw material, part: in process, or finished goods
Inappropriate Processing	Doing more work that is necessary
Unnecessary Motion	Any wasted motion to pick up parts or stock parts. Also wasted walking
Unnecessary Transportation	Wasted effect to transport material, parts, or finished goods into or out storage, or between processes.
Waiting	Any non-work time waiting for tools, supplies, parts, etc.

Figure 2 shows that VSM & TACT contain the concept other "Lean Construction" tools.

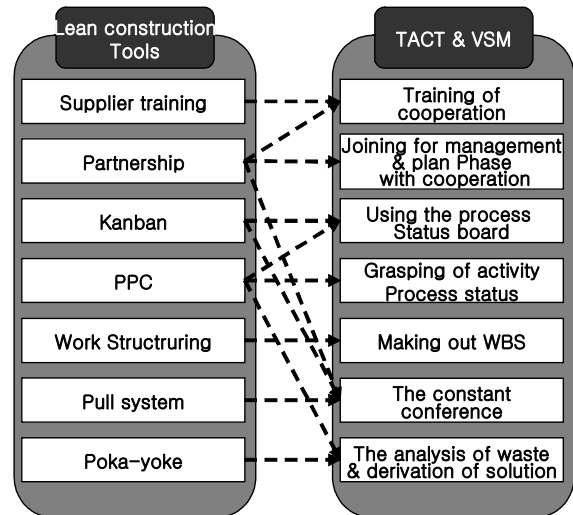


Figure 2. Connection between Lean Construction Tools and TACT & VSM Tools

2.3 Value Stream Mapping

It is the stage of describing and diagramming the stream of all current activities requested for the escorting operation through the current production process streams to easily define the embodied values of each stage, expressing clearly the needed reforming element that should be achieved on that stage. In the view of making a productive value, it is the stage of eliminations, improving of minimizing the waste by examining the waste of the material flow and information flow shown in the process of work (write out CSM)

Figure 3 shows the value stream mapping process.

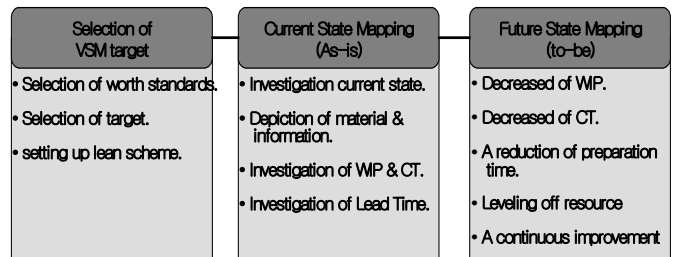


Figure 3. The conceptual procedure of VSM

2.4 TACT Process Management

TACT Process Management is making a continuous work process in the stream of previous and following work by dividing the work zone equally and giving settled unification of work period. The purpose is to improve the quality by the equalization of materials using quantitative time and production construction which is distinctive in it's stream work, and by the attainment of shortening the time having the lag time "zero", and lastly by the standardization of the check point and each process activity.

The method and the procedure is to make a full use of the know-how of the cooperation company and to have an process management not by one-sided progress procedure, but by conference and self-regulation. The precondition is complete prearranged plan which needs exhaustive

construction plan including drawing review, temporary installation plan, finish work plan etc.

3. PROCESS INNOVATION TOOL & TECHNIQUES

3.1 Application process & method of VSM

We will analyze the interference between processes activity and the interference between previous and following work in 4group; absence, deficit, redundancy, pendency, and will hold these expected work interference in common to prevent it. Then we will classify all works related to material flow in to 4 groups; moving, waiting, dealing and checking. Except dealing, other three groups will be defined as a non value adding element, which should be eliminated the best possible to increase productivity of the construction management.

The values of this process are largely elimination of interference between works and of the waste element in the process of material stream. These values can be understood by the Figure 4 below.

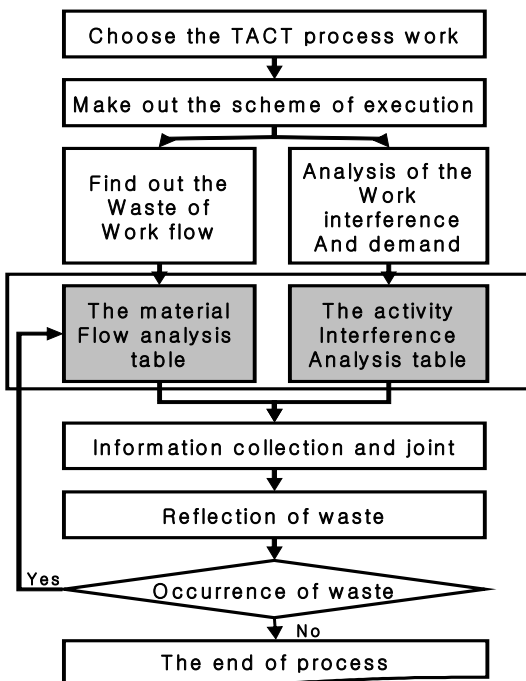


Figure 4. Application process of VSM

The genecon selects TACT process activity using WBS and general process schedule and is supplied process scheme of execution from the cooperation.

To solve the recent problems of process management resulting from lack of interchange in information, a master of process management should send the process of all the detailed work of process, and cooperation should grasp detailed information of the process and examine the interference factors which can delay the construction period in advance and send back the activity interference analysis table to eliminate that object.

At the same time, for the specific draw up of the resources wasted in the material stream, cooperation should write the flow type, needed resources for moving, etc based on the

similar result or experience and the material supply plans in the scheme of execution. A master of process management should make the materials flow analysis table explaining the matters that demand special attention to eliminate the non value works found by measurement of materials flow.

A master of process management should combine the activity interference analysis table collected from cooperation and eliminate the waste factors by reflecting the activity interference analysis table and materials flow analysis table, which was written by writing interference matrix between processes and enforcing the process meeting, in the construction.

3.2 Application process & method of TACT

The flow to carry out TACT process management for the application of TACT can be divided in to the stage of basic process plan, detailed process plan, and process management. Basic process plan is establishing a TACT time schedule by examining the applicability of the TACT process management, estimation of the order and time span of the construction and the applicability of the entire management flow. Detailed process plan is choosing and educating the cooperation, making work card and deciding the unit of cycle, settling the time and plans of the work, enforcing the conference with the final the head of cooperation about the process of making the detail process schedule and planning.

Process management is divided in 3 stages which are confirming and carrying out the plan, preventing the possible risk factors by holding conference continuously, and finally finishing the construction process. Figure 5 shows the application of TACT flow

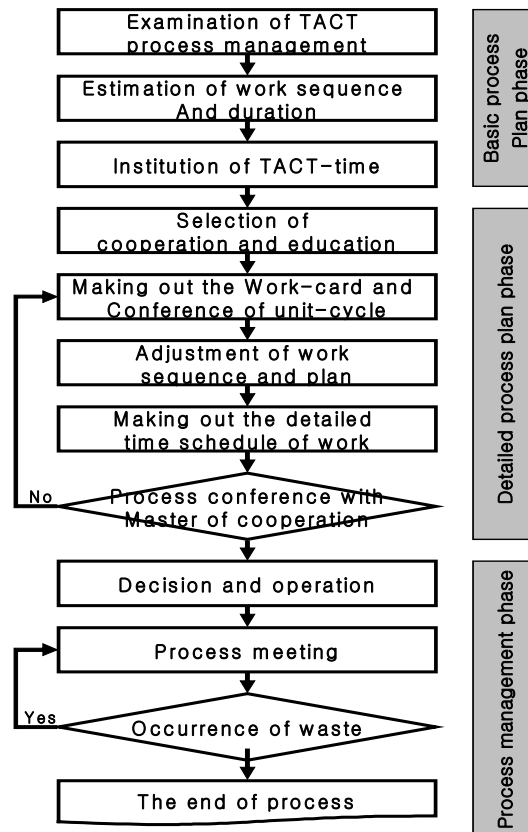


Figure 5. Application flow of TACT

The Procedure of Lean Process Management

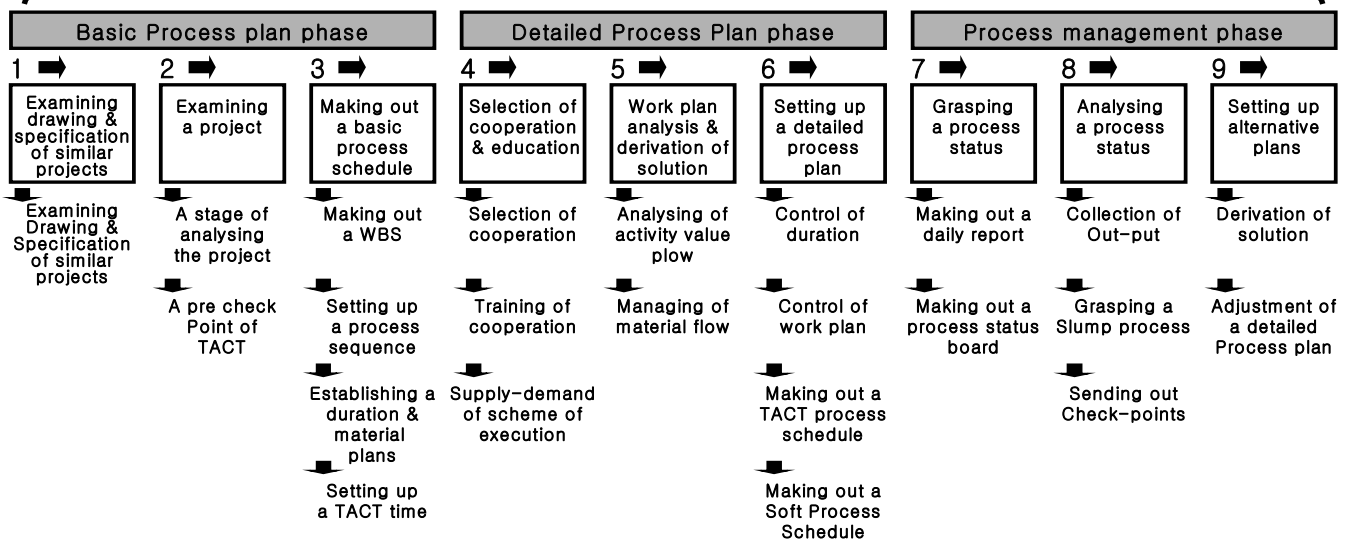


Figure 6. The procedure of Lean process management

3.3 Process innovation management

(1) Basic process plan phase

Basic process plan is a stage of analyzing the items that should be examined for establishing the process plan, examining the facts that should be considered before applying the TACT process management in the project, and making a basic data for the actual application of TACT process management by establishing a TACT time on the TACT works selected after making basic process table.

At this time the TACT time draft established should be based on the previous accomplishment data, and it becomes the basic data for mediating works in the detailed process plan

(2) Detailed process plan phase

Detailed process plan is a stage of getting a continuous flow in the process of work and analyzing the waste factors in the material stream. It is a stage of making the process management of the actual unit of work management reflecting opinions by analyzing the collected scheme of execution after choosing the cooperation.

By analyzing the scheme of execution of the cooperation the interference factors should be found in advance to reflex it in the detailed process plan and, and conference will be held to decide the advance examining items to eliminate the waste factors based on moving, waiting and checking

On this stage the analyzing of the waste factors in the material stream is only an advance preparation to find out the non value activity in the order of the work process and moving, waiting, dealing and checking. It is by analyzing the detailed work in the step of process management that these waste factors should be eliminated for spontaneous participation.

Also by the standard of the TACT time established on the basic process plan, the final TACT-time should be arranged by conferring with the cooperation to settle the plan and the time of the construction. After that TACT process table about the chosen TACT should be drawn based on the settled plan.

(3) Process management phase

In process management phase, first daily report and process status board should be made, and process status grasped, and finally the Out-put should be analyzed, which will define the slump process to perform the planned process successfully by the defined the process schedule from the detailed plan.

In addition, we can find out the TACT achievement rate by checking the TACT time when analyzing the Out-put

It is phase of analyzing the slump process found, sending out check points, setting up alternative plans of the future work, and reflecting it in the detailed process plan.

(4) Process innovation management manual

To operate the Lean theory in the process management, Lean theory and the presentation of the systematical formality and method should be analyzed specifically.

Therefore in this study we drew a manual for the Reformed management Process to solve the absence of formality and method in actual results process management, and systematic process management by supporting it in the aspect of management.

The manual supplements a plan which should be presented based on the substance of process management work of previous domestic constructions, proposing a formality and method made possible manage for all participants to make a practical process management and to manage it, where as before it was only limited for support of Genecon and few master of process management.

4. CONCLUSION AND FUTHER ASSINGMENTS

To improve the efficiency of the whole process management through resolving the unbalance, and cooperation system, the study developed BPIMT applicant on the field by actually using the VSM and TACT, one of many "Lean Construction" tools and techniques which has

only been a theory in the domestic.

And then we divided it into three process; Basic Process plan phase, Detailed Process Plan phase, Process management phase to improve trust in process management, to stable the process, and to increase the efficiency in Architecture Production.

It also established a process innovation management threw out the whole business of process management from planning to administrating, presented the elements that should be considered and method of achievement at each step, also newly defined the waste factor developing a formality and a form possible to analyze in the field, and finally set up a standard of the assessment of process by checking the TACT achievement rate.

Future assignment is to modify and supplement continuously in the problems in the process of applying the BPIMT on the basis of the study presented and making it practical in the field.

For this, the pilot site will be picked and conference and educational program will be held after conferring the general matters and information about VSM, TACT will be referred to the manual

Finally, we are planning to increase degree of completion of the process innovation management manual by clarifying the matters to improve, supplementing the problems by analyzing accomplishment data.

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