

# **A case study of reengineering public works management at a Japanese government ministry through a “P2M” based program and project management method**

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## **Abstract**

This paper details the findings of a case study carried out through the implementation of the “P2M” [1] for Government public works management. The result showed a drastic reduction of the construction works duration, improved profitability at contractors, enhanced quality of work, significant improvement in motivation of all players, such as Government officials and contractors, and a higher satisfaction level for local residents. It was analyzed that the major contributor of this test project success is “Communication & Collaboration,” while the traditional Government management, using excessive rules and manuals, causes undesirable human behaviors, which reminding us that it is people who conduct tasks in projects.

*Key words TOC, P2M, Critical Chain*

## **1. Introduction**

With the recent drastic reduction in public works activity due to the financial difficulties of the Government, the volume of orders local construction companies have received has shrunk to less than half of that in the past. Faced with this severe business environment, some local construction companies are struggling to survive, and some have already been forced into bankruptcy. At the same time, a series recent of large-scale natural disasters has raised attention to the importance of public construction works, historically mostly carried out by local construction firms. This issue is being discussed widely with increasing concern. Under these circumstances, the Government has been exploring a paradigm shift in public works management by implementing various action plans. However, there has not yet been much in the way of positive outcomes.

A one-year case study was conducted with the objective of outlining an ideal public works scenario. The study covered analysis of the current situation and its considerations, through implementation of verification of solutions. This case study showed a wide-range of benefits including significant reductions in construction time, creation of corporate profit, improvement in the convenience of local residents, and furthermore, improvement in the competence levels of government officials by communication & collaboration amongst all project stakeholders.

## **2. Analysis of the current situation**

In P2M methodology, gap analysis is stressed, clearly delineating the difference between reality and the ideal. To accomplish this, a “Questioning Session.” was conducted by the author for the members of Government officials of Hokkaido Regional Development Bureau of Ministry of Land, Infrastructure and Transportation (MLIT). Over 20 managers from different divisions attended this session where they were asked to write three responses to a question, “What is preventing you from doing good job in public works?” The session leader then challenged, “Why? Why? Why?” to each problem given, until all the problems noted were drilled down to the root-cause issue to be solved.

## **3. Consideration of solutions**

In the Questioning Session, three major undesirable effects were studied.

- Low contractor profits (losing money in many cases)
- Government financial difficulties
- Poor cultivation of government human resources (how to educate experience to young people)

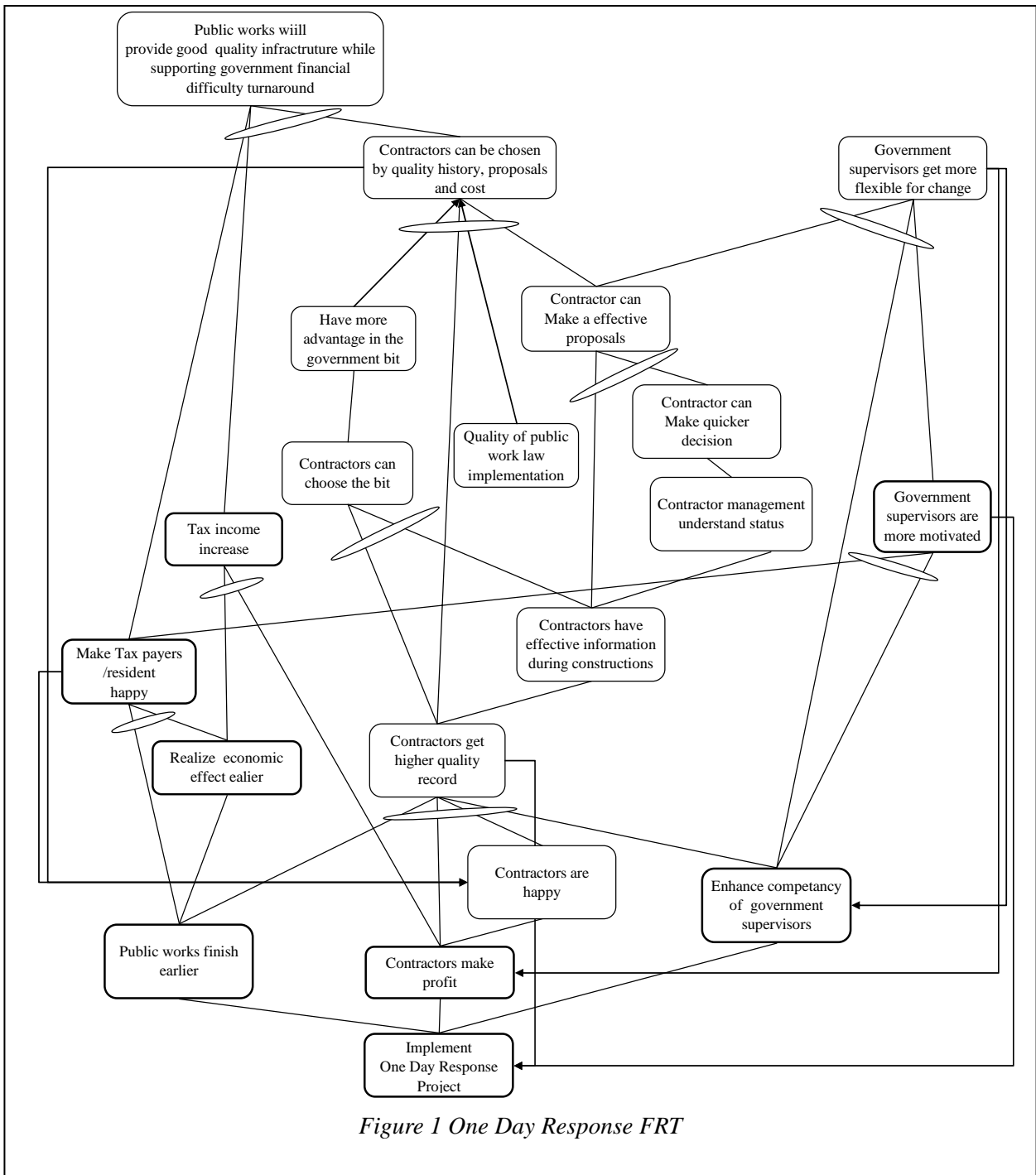
One of the large problems that contractors highlighted was the long downtime experienced during construction when government officials need to agree to engineering changes as a result of unexpected issues. Uncertainties are inherent in construction work. There are virtually no two construction projects that are carried out under exactly the same conditions. In particular, as nature plays an important role in most public construction, the uncertainty involved is extremely large. Thus, contractors consult government supervisors on a daily basis regarding changing construction techniques or design. These changes force delays and budget overruns, creating frustration and inconvenience among all stakeholders. Following the analysis and discussion of the findings to remedy the undesirable effects, attendees concluded that the most important and powerful solution that the government could implement was to respond to the contractors quickly. We named this effort the “One Day Response Project”<sup>1</sup>

To verify the direction of this solution, a “Future Reality Tree,” or “FRT” was used—a tool borrowed from the “TOC Thinking Processes.”[2] The FRT uses cause and effect sufficiency logic, which uses an “If/Then” approach. This logic verifies whether a certain solution is truly effective for solving the problem.

Figure 1 can be read starting from the bottom: “If the One Day Response project is implemented, then public works finish earlier” than scheduled. Contractors will have less futile waiting time and will start making more profits even in severe situations. Furthermore, in order to reply in a day, government supervisors will act on the situation quickly, enhancing his or her management capabilities by prompting discussions with their more experienced managers. In addition, if the infrastructure is completed earlier, taxpayers/residents will be happy. If they are happy, contractors as well as government supervisors will also become happy. On top of that, economic effects from the public work will be realized earlier, and the local economy will be vitalized earlier. If collaboration between government supervisors and contractors is enhanced, the quality of the public works will improve. If the quality of public works improves, in accordance with the new government law “Quality of Public Works,” contractors can be chosen by not only by cost but also by quality history and technology proposals. If good-quality infrastructure is provided earlier than scheduled, demonstrating economic effects earlier as well as enabling contractors to make profits, tax income will increase. Thus, public works will contribute to financial reconstruction while providing good-quality infrastructure. In other words, adoption of the One Day Response Project was confirmed to be an extremely powerful remedy for the three problems mentioned before. Looking once again at this Figure, we recognized the **“One Day Response Project was confirmed to be a project that enables public works to return to its origin.”**

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<sup>1</sup> One Day Response is a symbolic naming which means to reply with utmost urgency. It does not mean providing all solutions in a day. It means that one should try to solve problems in a day as much as possible, but even in cases solutions cannot be provided in a day, one should make some kind of reply that would enable the building constructor to make plans for next steps.



#### 4. One Day Response Project evaluation

In the Sapporo road office Hokkaido Regional Department Bureau of MLIT, a young government supervisor was instructed to avoid downtime in construction by providing One Day Response to contractors. Five sites were managed simultaneously by him. After completion of all sites, a letter was brought to our attention. Here is a part of the letter with the permission of the sender, Shinji Hirogami, foreman of Sunagumi Corporation.

*Lastly, we were able to make a higher profit than in the original plan. I feel that the approach of the government supervisor was different from projects in the past; he acted in a way so as to allow construction to proceed smoothly. Or rather, I should say that it made me feel as though he himself was carrying out the project together with us as a team. It became a wonderful construction work where quick responses and*

*good communication enabled good quality work to be completed much earlier than original plan, which pleased the local residents. Everyone who worked on the site felt a sense of satisfaction. I would like to express my heart-felt appreciation.*

*November 25, 2005*

*Shinji Hirogami, Sunagogumi Corporation*

In order to find out why such an output as mentioned in this letter was made possible, the author visited the government supervisor who received this letter. His comments are:

- Forecasting and simulating are important in construction work in order to avoid downtime
- It was easy to handle the work because Sunagogumi, the contractor in charge, had a strong awareness for their work, and their unique progress report allowed us to visualize the situation. Initially, I felt rather concerned because the duration for each task was estimated very aggressively without any “SABA” (a Japanese word for safety or buffer in each task). However, I found that as they controlled the schedule by using buffer aggregated at the end, it was in fact intuitively easy to understand<sup>2</sup>.
- If the contractors present a schedule without any SABA, a sense of trust is born, making people feel that they are working together on the construction. It is easier to work in such a case compared to cases in which contractors provide ordinary schedules full of hidden safety in each task.

His boss, the group manager said, “The most crucial problem in construction is the downtime which delays completion of public works projects and sometimes causes budget overruns. Uncertainty always exists in public works projects. Thus, quick decisions and responses are important so that work progresses. Therefore, I gather members in my section on a daily basis to insure the work has not stopped. If there are any problems, we deal with it quickly as a team. There are some cases in which we are unable to immediately reply, and the work must be stopped. In such cases, we check with the contractor as to how long they can wait, and make every effort to reply by their deadline.” His words precisely indicate that **his team is practicing One Day Response for not stopping the work**. On the other hand, they also said that whether they can respond quickly also depends on the ability of the contractors. No matter how committed the government supervisor may be in responding quickly, he or she sometimes cannot do so depending on the proposal and the communication skills of the contractors. In the case of the construction work Sunagogumi handled, the supervisor found he could do his job far more easily.

Sunagogumi has now adopted Critical Chain Project Management (CCPM) [3] to shorten construction time. What especially unique in this method is the aggressive task duration estimates (which eliminate SABA in each task and schedule the due date with 50% probability of success) and the placement of a project buffer, aggregated and added to the end of the project, which can be used to protect the due date from variations in the project. This buffer is then managed by monitoring the consumption amount of the buffer. This can be said to be **verbalizing the “DANDORI HACHIBU” (Preparation is 80% of success), which had been practiced as tacit knowledge for many years in the Japanese construction industry among excellent foremen.** [4]

The government supervisor felt that the method used by Sunagogumi[5] of communicating honestly without SABA made it easier for him to understand what was happening. It enabled him to forecast and study any necessary changes in construction, in a working relationship based on trust between the two parties. As a result, less effort and time were required compared with the other four contractors.

## 5. Collaboration through sharing the buffer

In CCPM, the consumption level of the buffer is shown in green, yellow and red in order of ascending seriousness. By monitoring the consumption level of the buffer and the changes in the color of the buffer, it is possible to take necessary preventive actions far before project delays actually occur and even to avoid them from happening. In other words, by looking at the indicator that shows the consumption level of the

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<sup>2</sup> It was after the construction work was finished that the foreman in charge found out that he had in fact empirically been using a process very similar to “Critical Chain Project Management” (CCPM) methodology, a solution for managing projects also based in the Theory of Constraints.

buffer, and by monitoring which tasks are consuming the buffer, one can take necessary measures before it becomes too late. If contractors use this method and share the status of buffer consumption with the government supervisor, any delay in response by the government supervisor becomes clear—it consumes buffer and the buffer color is changed for the worse. Thus, it can be seen that a shift will occur in the awareness of the government supervisor to make decisions and respond to the contractors more quickly. Conventionally, contractors have the tendency to hide SABA as much as possible as safety to prepare for uncertainty and to meet the due date. This tendency can be observed not only in the construction industry, but also in general industry. **It is a valuable lesson to learn that by showing the schedule without safety and by sharing the buffer, cooperation/teamwork is much enhanced.** This can be attributed to the fact that by revealing the true picture, communication between the two parties was accelerated. Most people who implemented CCPM have the impression that communication is greatly enhanced thanks to buffer management. They regard CCPM as a communication vehicle. In this case, it seems the simple and easy buffer mechanism enhances communication and creates teamwork throughout construction sites.

## 6. Human resource development

Both the government supervisor and contractor foreman made comments that human resources were cultivated during this project due to communication and teamwork enhancement—where they mutually learned from each other. Some even said that cultivation of human resources was above all the largest output from this case. [6] The findings of the author from the interviewing the government supervisor and his manager are:

- The young supervisor started taking the initiative to consult with the managers without hesitation, making the job as manager much easier
- By consulting sooner, issues were finalized sooner. As a result, over-time work was reduced, allowing people to go home early
- The young supervisor felt that he really managed this public work with contractor through teamwork
- The young supervisor felt more motivated because local residents appreciate their work

In order to educate young people, they sometimes must learn by experience. It seems that the One Day Response Project accelerates learning speed and provides excellent environment for young people to learn things by experience.

## 7. Future plan

This case suggests One Day Response Project on government side will create a substantial synergetic effect by combining it with CCPM on the contractor side. In order to turn these findings into statistically meaningful analyses, there is a need to verify them widely, using public works of different size and types. This is now on-going.

## 8. “Communication, Collaboration and Commitment” management

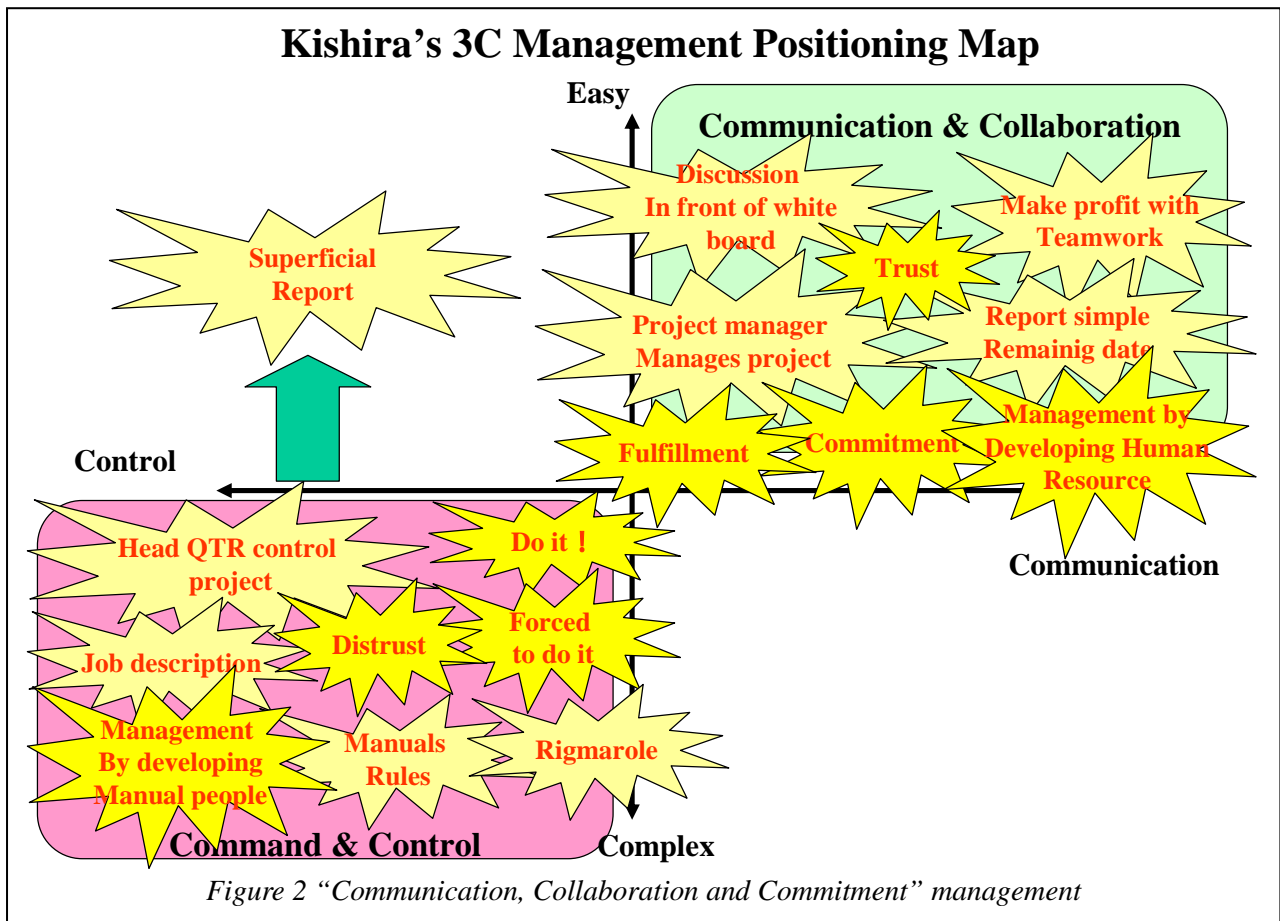
What was interesting in this case was that most of the people involved mentioned that they found their work more interesting and rewarding. In order to implement One Day Response, the supervisor in charge needs to closely communicate with contractors. Furthermore, he needs to do everything necessary to advance the work, always consulting with his superior. Finally, according to the level of consumption of the buffer, it becomes very clear what actions to take in advance to avoid any delay in work on the project.

In short, the communication among all the concerned parties regarding the project was greatly accelerated using One Day Response Project. When one considers this, it suggests that there is a paradigm shift in the management method. Figure 2 shows positioning map showing this paradigm shift. By plotting from easy to complex on the vertical axis and from communication to control on the horizontal bar, we can obtain interesting findings. The quadrant at the bottom left shows the management by Command & Control, used in a traditional pyramid-shaped organizational structure. Here, the logic that “The Headquarters must control the site,” and “The government must control the contractors,” play a very important role. The job description

must be clearly defined and people become preoccupied with making manuals and rules in order to control people as if they were soldiers. Unfortunately, this method leads to “making people work according to the manual losing creativity of working on their own.” Thus, people end up carrying out their work with the feeling of “being forced to work.” It is only natural that in such an environment, achievements are hardly obtained. Furthermore, with this method, since documentation must exist assuming all types of problems and issues, massive manuals and rules are made as a result. It is almost impossible for people to read and understand and act upon mountains of instructions correctly. People quickly learn that in the midst of incomprehensible and massive manuals and rules, it is safer and more advantageous to “spend time without making serious blunders.” They understand that heavy penalties await them if they disobey what is written in the manuals and rules. It is difficult to carry on work when one is bound hand and foot by complex manuals and rules. If a person in such a situation is asked to submit a progress report, he or she will report in a way that follows the format but is superficial in content, in order to technically handle the reporting work along with all the troublesome work he or she is bogged down with. Then if there are problems, it leads to much tighter control. The Command & Control culture gets more solid while people lose flexibility in doing their job.

On the other hand, the quadrant at the top right shows “Communication & Collaboration”. **People carry out Projects.** Projects contain uncertainty due to their very nature. The importance of communication through dialogue among the team is immeasurable. Considering this, it can be said that **projects will produce higher output only through people sharing their wisdom and conducting discussions in front of the whiteboard.** The project leader manages the site and reports achievements to headquarters, carrying out the project as a team. **Through Communicating & Collaboration with others, people share “a sense of challenge” and “fulfillment,” and will make the commitment on their own will to work on the project.**

In the quadrant at the bottom left, Command & Control, management leads by making people work according to the manual (“manual people”), while in the quadrant at the top right, Communication & Collaboration, management can be called a management to “cultivate people”. If one understands the reality that projects are carried out by people, priority should be placed on how to motivate people. Considering this, it is natural that management of “cultivating people” will produce much more output. The people involved in this case study consider the greatest factor for success was the existence of Communication & Collaboration, creating Commitment to do a good job among all project members.



## 9. Conclusion

Key success factors of this case study are underlined in debating process at initiation, sharing essential problems in planning, and managing human psychological factors in execution. Needless to reiterate, P2M framework combined with CCPM methodology provided an excellent guidance to all project members undoubtedly. In brief, the human centric project management is the core proven in this case lessons, which represent the essence of P2M.

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