Preface to Japanese language edition (1997)

I. Problem Areas in Existing Thinking Methodology and Management Methodology

We believe the following problems remain in the field of scientific management methods.

(1) Among the existing techniques developed to increase management efficiency are engineering methods such as VE (Value Engineering), IE (Industrial Engineering), QC (Quality Control), and Project Management. These should be universally applicable, but in some cases there is a gap.

Isn't there a way of supplementing and appropriately joining all these methods together?

(2) The NM-method invented by Masakazu Nakayama, and the KJ method (affinity-method invented by Jiro Kawakita) are excellent for producing ideas and understanding phenomena, but when it comes to linking them with concrete business, including VE, IE, and QC, there is a gap.

Isn't there a way of appropriately joining together and supplementing all these methods?

(3) Project management is supposed to start from the Gantt chart and WBS (Work Breakdown Structure), but there is no established procedure to create procedures and WBS before the Gantt chart. Isn't there a good way of creating such a procedure?

(4) When developing new products or organizations, or improving cost and performance in industry and government, a wide range of structured Quality Assurance (QA), Quality Control (QC) and Quality Improvement (QI) becomes necessary for the thinking and work processes.

Isn't there a good way to assure that these processes are structurally faultless?

(5) A manager realizing a task must orient the parties concerned in a common direction, generate consensus and motivate them.

Cannot one create a clear measure or procedure for doing these things?

(6) To achieve a concrete target cost or performance, the operation must be divided into steps.

How can these steps be set to achieve a creative faultless rational process and its decision-making?

(7) In the above, there is some confusion between the scientific method and the engineering method, and a proper coexistence is called for. Isn't there a way of appropriately dividing and combining these two

methods?

This book is meant to answer these questions.

II.   What are the characteristics of the thinking and procedures appearing in this book?

(1) The purpose of this book is to observe our casual thinking, actions, and patterns of decision-making with regard to their cause and effect, and recreate them in a visible form.

(2) The object may be software, hardware, or a mixture of both.

(3) Using cards, the roles and abilities of the brain are mapped onto paper as purpose and measure. This is hypothetical, but the purpose should reflect the thinking in the forebrain, and the measure, the hindbrain. For concrete creative action and judgment, the direction of value, focus, and entrance key are further fixed on paper. This allows the value creation of a group to take on a visible form.

(4) The left brain, the site of logic and language, and the right brain, the site of experience and image, are alternately and faultlessly collated for creative thought and action. This collation of procedure and image is drawn upon paper.

(5) Therefore, this creates procedures and structured thoughts which were previously only in the realm of concepts. Also, it can be used as a means of thinking or as a way of observing natural phenomena which were previously only in the realm of concepts.

(6) Through this, creative methods, management methods, and measures developed by our predecessors and ourselves can be reconsidered, supplemented, and combined according to the purpose.

(7) Also, we may clarify the usage of words and their relationship, which were ambiguous before.

(8) Based on the above, Design To Cost, which was previously only in the realm of concepts and policy, was made into a procedure by the author in 1976. This made target design possible.

(9) After the Thinking and Its Procedure for Design to Cost (DTC Method) was established and put to

practical use, the Method of Design To Customers' Needs was established. These two methods were combined into a further general technique, which constitutes the content of this book.

III.   How the Japanese version of this book was published

The first publication, which is the basis of this book, was a booklet "A New Way of Thinking and Procedure for Design to Cost" published by the Sanno-Daigaku Publishing Co. in 1984. The author was working for the Kawasaki Heavy Ind. Co. Ltd. and publication was requested by the NASDA (National Space Development Agency of Japan).

In those days, copying machines did not have magnification functions, and it was necessary to set the format at the end as A3 or A4. The publishing company was of the opinion that the book size should be B5 to place it side by side with other books on the bookshelves of book stores; otherwise the book wouldn't sell. However, priority was set on the practical use of the format and its copying, resulting in an A4 edition. Consequently, the first book was on the shelves for only a brief while, and not many people had a chance to read it. This book then was published after the following process:

1. Acknowledgment of copyright to the author when he retired from Kawasaki Heavy Ind. Co. Ltd.
2. Request from Defense Agency executives to leave the techniques contained in the book as collective know-how.
3. After retirement, entrance of the author into the Tokyo Institute of Technology Graduate School Adult Program Doctoral Course, 1 year and 3 months of putting together the material into a thesis, fulfilling the Doctoral Course requirements, and receiving a Doctorate.
4. Two years as Professor at the Post Graduate School of Business Administration, Asahi University, Information Administration Science, Project Management Laboratory, the material was adapted as an educational reference.
5. The publication of the Japanese version was backed by the Miyata Fund of Asahi University and Kazuhiko Nishi of Ascii, Co.
6. The English translation was backed by "Grant-in-aid for publication of scientific research results" of the Ministry of Education of Japan.

Following the above, the book saw publication.

IV.　The Application and Structure of this book

1.　Apllicatins

This book is for people who wish to use the methods (thinking and procedures) set herein.

Based on its practical success, the material was submitted as a thesis in 1993 at the Tokyo Institute of Technology, Science and Technology Department, Management Technology Doctoral Course. Further commentary and supplementary material were added to make the book easy to read and useful as a manual in actual business.

I hope new applications will be forthcoming from people who read and use the book.

Note: This book is also a supplement to *Aerospace Engineering Handbook*, Chap. A9, "Development Management," edited and published by the Aerospace Engineering Society of Japan (Maruzen 1992).

2.　A summary of the methods in the book

1.　Our methods are creative management methods which start by setting the same view of value among the people concerned (including the customer), and can be used in research, development, and materialization of the objective as well as in the improvement of daily business.

Note: The definition of the term "view of value" is given in "View of value by PMD," item 3.1.3(5) in this book.

Our method/methodology consists of the Methodology of DTCN (Design to Customers' Needs) and the Method of Design to Cost (DTC) using the DTCN methodology. Our methods are compatible and complementary with existing techniques (IE, VE, QC, QFD, TAGUCHI, KJ, NM etc.). Using our methods, where and how the latter ought to be used are clarified as input-output relations. In particular the Method of Design to Cost (DTC) has economic realization as its goal. In the development stage of something, performance, cost, quality, and scheduling are treated as management elements at an equal level, and their targets are set. This method creates specific procedures and follow-up mechanisms to realize the targets within a reasonable range.

The development of these methods began in 1974, and they have been used in several official projects since 1981. Recently, based on these methods, further application methods have been developed and put into practice.

2. The Structure of DTCN Methodology and the Method of DTC using DTCN Methodology

  The structure of DTCN/DTC thinking and procedures (DTC Methodology can be used independently) is shown in Fig. 0-1. We explain the contents following the box numbers in Fig. 0-1.

(1) Understanding and policy

01. Decision Mechanism by Information of Difference

    – analysis of the decision mechanism, and thinking and knowledge for their appropriate use

02. Proper Use of "In order to," "How to," and "Why" Questions

    – thinking and knowledge for aligning the vectors of creative thought and action

03. Thinking and Policy of DTCN

    – policy to create social significance for the results created by the methods

(2) The 7 Basic Methods of DTCN and Supplementary methods

  1.   PMD (Purpose-Measure Diagram) Method (a.k.a., the Method of Key Word)

  Using this method, parties with a given theme do the following:

a. Create a relation between purpose and measure (direction of value). (This applies particularly to something without precedent.)

b. Grasp the appropriate "Main Key Word." (verb and noun expression of the objective with minimum of adjective and/or adverb)

c. Clarify where to start from in order to achieve the desired result (Entrance Key Word)

  Using the above, the parties concerned come to have a common direction of value. Incidentally, there are two types of PMD method, "Theme PMD (1A)," a search for an expression for the appropriate task or theme/subject, and "Action PMD (1B)," a search for a Key Word in the form "Do something" for that task.

  2.   Steplist Management

  Using this method, a procedure is created for a phased and faultless operation, and decision-making.

  3.   3-5 Phase Improvement

  Using this method, the improvement approach pattern from the present state can be divided into 3 or 5 stages, and balanced improvement and development becomes possible.

4. FBS/WBS Technique (FBS: Function Breakdown Structure, WBS: Work Breakdown Structure)

Using this method, the optimal image structure of the desired result is created.

5. WBS Theme Phasing Technique

Using this method, the themes/ideas which are worthy of consideration in realizing the intended result are gathered from the people concerned and examined in appropriate stages.

6. Root Organizing (RO) Method

Using this method, root organizing is performed, and a procedure to materialize new things within the organization is created and operated.

7. Making of the Implementation Plan Document and the method for its execution

Following the policy of DTCN and using methods 1, 2, 3, 4, 5, and 6 above, the head of an organization approves the necessary procedures as the Implementation Plan Document, and follows up the planned procedure and its contents in an implementation plan.

8. Supplementary methods to the 7 Basic Methods of DTCN

The methods below are used as supplements to the 7 basic methods of DTCN as necessary.

8A. WBS (Re-definition)

A method of redefining the concept of Work Breakdown Structure, and making it easier to use.

8B. WBS in Moebius-Style

A method which creates an entrance and exit for the "chicken or egg" type loops which frequently arise in the early design stage, and spontaneously creates a rational examination process.

8C. Pre-evaluation and Structuring Method from a Rational Perspective

A pre-evaluation method of rational comparison to practically weigh the structure and elements of the objects being compared.

(3) DTC Methods

When target values regarding cost, performance, scheduling, quality and so on must be realized reasonably, the following thinking, standards, and methods are added to the DTCN method, and Design To Cost (DTC) is performed.

9.   Knowledge and Cost Management Flow Chart of the Company

Management cycle of know-how and cost to be observed so that companies fulfill their social mission. This should underlie DTC.

10.   Reasonable Price and Its Standard

10A.   Steplist for Reasonable Price

  Shows how a reasonable price is arrived at.

10B.   Price and Cost Breakdown Table for Cost Control

  Provides a map for appropriate and reasonable cost control

10C.   Decision Standard for Price

Enumeration of knowledge and information when setting the price.

11. Common Procedures of DTC

11A. Minimum knowledge to proceed with DTC.

11B. Essential conditions to proceed with DTC.

12.   DTC for Unit Production Cost

  - This includes DTC for lifecycle cost

  - Procedures to realize target of unit production cost during development which have been difficult with conventional methods.

13. DTC for Developing Cost

  This shows the difference between the DTC procedures for unit production costs, and how to do DTC for developing cost.

3. Purpose-Measure Relationship of the 7 Basic Methods of DTCN

The purpose-measure relationship of the 7 basic methods of DTCN is shown in Fig. 0-2.
In short, the DTCN method starts from a theme or subject. If the theme or subject is unclear, one can start after the theme or subject is clarified by the KJ method or Theme PMD method.
(Note: Usually the theme-PMD method is sufficient for clarifying the matter. If a problem is unsolvable, it may be switched to a theme, which allows the application of the DTCN method. Sometimes, switching a problem to a theme or subject is sufficient to make the problem vanish, and to show how the theme can be

xxx

realized.)

However, if a procedure in the present stage of the realization of the theme or subject cannot be linked via a rational story, and such a PMD and Steplist cannot be created, this means that the theme or subject cannot be realized. This method thus allows for the discrimination between things which can be realized and things which can not.

4. Applications of the DTCN/DTC method

The DTCN/DTC method can also be used as follows:

(1) In daily business, a problem or theme which provides no clue as to where or how to seek a solution may arise. In such a case, this method can create an action procedure through individual or collective ingenuity to the extent allowed by the laws of physics and chemistry.

(2) To supplement the existing IE, VE, and QC methods, and allow for a more effective use of them. According to the purpose of the project, these methods can be allocated to the most appropriate step in the input-output relation in order to achieve the objective.

Note: A brief summary of each method.

IE method: method to increase the efficiency of the operation, starting with "What is the problem?"

VE method: method to increase effect through selection of measures to realize functions, starting with "What is it?"

DTCN method: method of mission realization, starting with "What is the theme?" and the Purpose-Measure Diagram

DTC method: an application of DTCN which sets a target cost by adding the consideration of cost to DTCN method.

(3) A method and measure which can realize, by actual procedures, what was hitherto in the realm of policy or concept.

(4) The use of QC methods alone for existing small group activities in the sales, development, and design departments will result in a limit. Therefore, the DTCN/DTC method may be used as a supplement or alternative. (The use of PMD, 3-5 improvement, or steplist may be sufficient.)

-5.   Other applications

See Table 0.1 "Cases where the DTCN/DTC method can be used as an effective tool"

-6.   Items to note when considering the introduction of DTCN/DTC

  - The essential condition is to make a PMD and steplist on a difficult theme once or twice. This allows the structure and procedure of thinking and action to be cleared of matters which appear to be understood, but are not properly so. One then understands what the target should be, how to reach it, and where and how to start.

  - Hence, if the PMD and steplist are prepared, relevant laws are clarified and can be visualized. As a result, the procedures necessary to achieve the target can be recognized on oneself and by the group. Thus, everyone is prepared for action and realization.

    Another item to note is that the PMD and steplists of others may not look impressive. The PMD and steplist have to be made by oneself. The skill of riding a bicycle can be acquired only by riding a bicycle oneself, not by studying it from a book or by only hearing about it. The same principle applies here.

VI.   The Pupose Measure Relationship of the DTCN/DTC Methodology:

    Read figure 02 from top to down repeating "In order to do AA, it is necessary to do BB."

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Fig 0.1   Structure of DTCN/DTC thinking and its procedures (DTCN methodology can be used independently)

Understandings and policy

- Decision mechanism by information of difference
- Proper use of "in order to, how to" and "why" questions
- Thinking and policy of DTCN

With an Episode of a psychological and creative way of thinking

1. The PMD method and nodding when trying to understand something
2. The PMD method can be used to investigate language
3. The PMD method can clarify "chicken and egg" relationship
4. The method of Key Questions.
5. The relationship between PMD, Steplist, FBS and 3-5 Phase improvement method
6. The accumulation of Knowledge and Wisdom.
7. The differences between male and female way of thinking.
8. A strange phenomenon in the visual recognition in the visual recognition of men and women
9. **The difference between men and women in dextro-rotation levo-rotation.**
10. **Avoding confusion between the terms "Problem" and " Theme or Subject"**
11. **The effect of two style of WBS.**
12. **The meaning of the evaluation and interpretation of the evaluation criteria.**

9   Knowledge and cost management flow chart of the company

DTC(Design To Cost) methodology using DTCN methodology

Appendix of Supplementary
A. The NM Method.
B. Supplemental thinking and methodology
C. The copy of MIL-STD-499A: Engineering Management.
D. The success story of DTCN/DTC methodology..
E. An Example of a implementation plan document and relative format.
F. One page explanation of DTCN and DTC methodology.
G.A method for changing Knowledge to Wisdom.
H. A procedure and format for thinking and action of Abduction, Verification, Evaluation and Decision-making to reveal and the past mechanism and to crate future mechanism .
I. The self organized flow chart to create and improve the goods, product , service, market with multi-screen wisdom desk, also with combining QFD,DTCN/DTC, TRIZ and TAGUCHI method.
J. The relationship between QFD ,VA/VA and DTCN/DTC.
K. The method of Project management/Accouting using reversal positioning of journal format and a method to create co-operative thinking and work place among Science / Engineering and Management/Accounting people)
L. An Autonomic Thinking Method for Creative Thinking with the PMD
M. Training by making a PMD to create a PMD

Methodologies

PMD method — Same view of value among the people concerned
- Theme PMD
- Action PMD

Seven method of DTCN
- To create the procedures → Steplist management / 3-5 Improvement
- To create image structure → FBS/WBS technique
- To create theme/ideas → WBS TPMT
- Organization root bound → RO method
- Verification and evaluation procedure as necessary → 7 Implementation plan

Method to proceed with Design to Cost using DTCN methodology

When it is necessary to realize the optimized cost, performance, quality and schedule target

8	Supplement method for DTCN method	8A	WBS (re-definition)
		8B	WBS in Moebius style
		8C	Pre-evaluation and structurizing method by reasonable feeling

10	Reasonable price and its standard	10A	Steplist for reasonable price
		10B	Price and cost breakdown table for cost control
		10C	Decision standard for price

| 11 | Common matter to procede with DTC | 11A | Minimum knowledge to procede with DTC |
| | | 11B | Essential condition to procede with DTC |

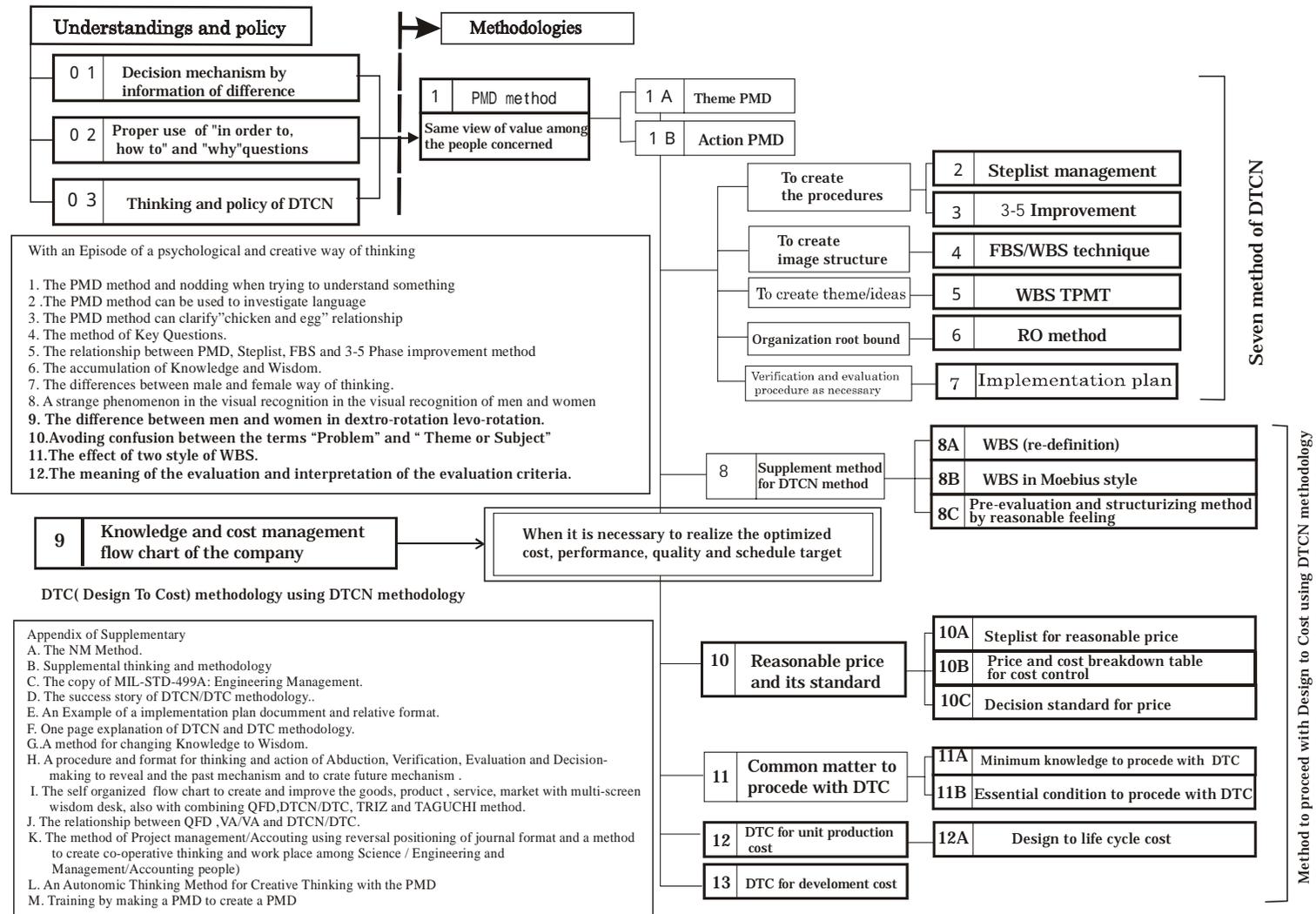| 12 | DTC for unit production cost | 12A | Design to life cycle cost |

| 13 | DTC for develoment cost | | |

Table 0-1 Cases where the DTCN/DTC method can be used as an effective tool.

1. For people in charge of planning

(1) To plan new products and products which sell

(2) To prepare a program planning document

- To create a new sense of value

- To appropriately phase development programs

(3) Phased decision-making for program planning and development: Creating a framework and an implementation plan.

(4) To judge the prospect of securing a reasonable and appropriate profit when materializing a plan. (If prospects are poor, the plan may be aborted at an early stage throuh the phased decision-making.)

2. For people in charge of Total Quality Control (TQC)/Total Quality Management (TQM)

(1) To create a sense of value among the parties concerned

(2) To direct decision-making

(3) To motivate (can be either top-down or bottom-up)

(4) To supplement and unify existing methods in TQC and TQM

(5) To extend TQC to TQM with respect to perspective and methodology

3. For people in charge of design

(1) To find how and where to start from" when they are unclear in the beginning stages

(2) To create organized design ideas and select the appropriate one

(3) To select candidate parts and dealers

(4) To establish a common wavelength with parts dealers; to proceed with hierarchical management control with dealers in the design and development phases.

(5) To gather the theme and ideas from the parties involved, and examine them in a timely manner

4. For people in charge of constructing information systems

(1) To use when faced with a difficult software problem, and when where and how to proceed are unclear.

(2) To update the idea and image structure of large-scale software from time to time

(3) To get the view of value and accompanying database accumulation

(4) To create a support system for decision-making

(5) To create future artificial intelligence (AI) algorithms

(6) To create the frame and content of a new integrated software

(7) To decide on procedures for complex programming

5. For people in charge of production technology (IE, CIM, FA, process planning)

(1) To achieve consensus with the aim of making a new process or improving an existing one

(2) To proceed with Plan to Cost

(3) To execute Production to Cost

(4) To achieve consistency between present processes and future process plans

6. For people in charge of procurement

(1) To clarify the conceptual setting and definition of reasonable price

(2) To decide on a reasonable price

(3) To identify the possible lowest price when reducing costs

(4) To present reasonable terms and conditions to estimate cost

(5) To acquire estimation, decide on price, place orders, evaluate results, and determine payment for

phased development

7. For people in charge of reducing costs

(1) To create a framework and system for cost reduction plans

(2) To come up with ideas, evaluate them, and realize them.

(3) To determine priorities for materializing the cost reduction

(4) To allocate which cost reduction method to use in which phase

(5) To probe the limits of cost reduction

8. For people in charge of business activities

(1) To create markets

- Determine the planning, program, and execution procedures for market creation

- Focus in on the market creation area, and fix a target for its materialization

(2) To convert user needs to product needs/seeds

(3) To assign roles within the department to involve the user in the development process

(4) To highlight the needs which users themselves could not give expression to

(5) To using the above, to take action to improve sales

9. For people in charge of Value Engineering (VE) and its improvement

(1) To supplement VE methodology (The determination of basic functional expressions is particularly clear with PMD method of DTCN methodology)

(2) To classify improvements as "as soon as possible", "urgent", and "optimal", and realize them

(3) To materialize VE or its improvement to the end (conventional VE only proposes the idea to be realized)

10. For people in charge of quality control

(1) To clarify the relationship between QA, QC, QI (Quality Improvement) and inspection

(2) To prepare to extend quality control assurance activities to the upstream of planning and design, and actualize them.

(3) To clarify the pre- and post- assurance activities necessary to ensure product quality.

(4) To assure coexistence and efficient functioning of problem-solving-type and

theme-realization-type quality control

11. For people in charge of development planning and management

(1) To create the same direction of value among the people concerned and make an action plan for joint development

(2) To make the implementation plan for joint development

12. For people in charge of the budget or audit

(1) To produce material and plans on the applicant side when drawing up the budget of a large-scale project

(2) To create the same direction of value between the person in charge of the project and the person who evaluates from the outside before the start of the project by:

• Making and establishing "evaluation standards" for each phase of a large-scale project in advance

so that its validity is ensured.

- Preparing a phased mechanism for stopping or suspending a large-scale project if a major problem is foreseen during its course.

13. For people in charge of research in behavioral sciences

(1) To apply the decision-making mechanism clarified in this book to various fields in behavioral science

(2) To decide on the basic posture and pattern for observation

(3) To identify sexual differences in thinking and action patterns

(4) To clarify the content of sensitivity as much as possible, and extend it creatively

14. For people in charge of management/system engineering

(1) To relate, supplement, and join existing methodologies, such as IE, VE, and QC.

(2) To assign various methodologies such as IE, VE, QC to the appropriate phase of a project

(3) To combine and use Japanese methodologies (KJ, NM, QFD, Taguchi Method) with foreign ones

(4) To produce the above as computer software, and make it available for large-scale systems.

15. For people in charge of improving international relations

(1) To fill in the perception gap between different nations

(2) To create the same direction of value in international operations

(3) To clarify and set procedural priorities on what should be done and what can be done.

16. For people in charge of language studies

(1) To create new words or expressions

(2) To clarify the relation between meaning and significance, etc.

(3) To clarify the relation (algorithm, definition, etc.) between natural language and language of meaning

(4) To Create grammar of thinking and procedure from a new point of view

17. For legislators, congressmen and administrators

(1) To remove walls between departments, and create new forms of administration, e.g.,

improvement of emergency medical systems

   (2) To appropriately interpret and apply laws, regulations, etc.

   (3) To review laws and regulations

   (4) To achieve public consensus on new operations

18. For people in charge of international joint development

   (1) To make a bargain scenario in international joint development (the exchange of "offer" and "acceptance")

   (2) To create the same direction value among parties concerned before starting international joint development

   (3) To fill in the perception gaps which are generated during international joint development

   (4) To create an implementation plan document for international joint development

19. For people specializing in philosophy, logic etc.

   (1) To add new thinking and procedures to existing disciplines

20. For people trying to proceed with re-engineering

   (1) To discover which processes should be subject to re-engineering (BPR)

   (2) To create a development procedure for which processes to realize

   (3) To maintain and review the completed processes

21. For companies acquiring ISO9000 and ISO14000 certifications

   (1) To create an implementation plan for effectively and efficiently acquiring ISO9000 and ISO14000

   (2) To develop processes which match ISO9000 and ISO14000, and faultless compact forms to be used there

   (3) To make a system which can be maintained and reviewed after acquisition

22. For groups wanting to develop CALS (Continuous Acquisition and Lifecycle Support)

   (1) To structure purpose-measure relationships in CALS components and activities

   (2) To weave the system of development, interface, operation and logistics, and disposal into the

CALS structure

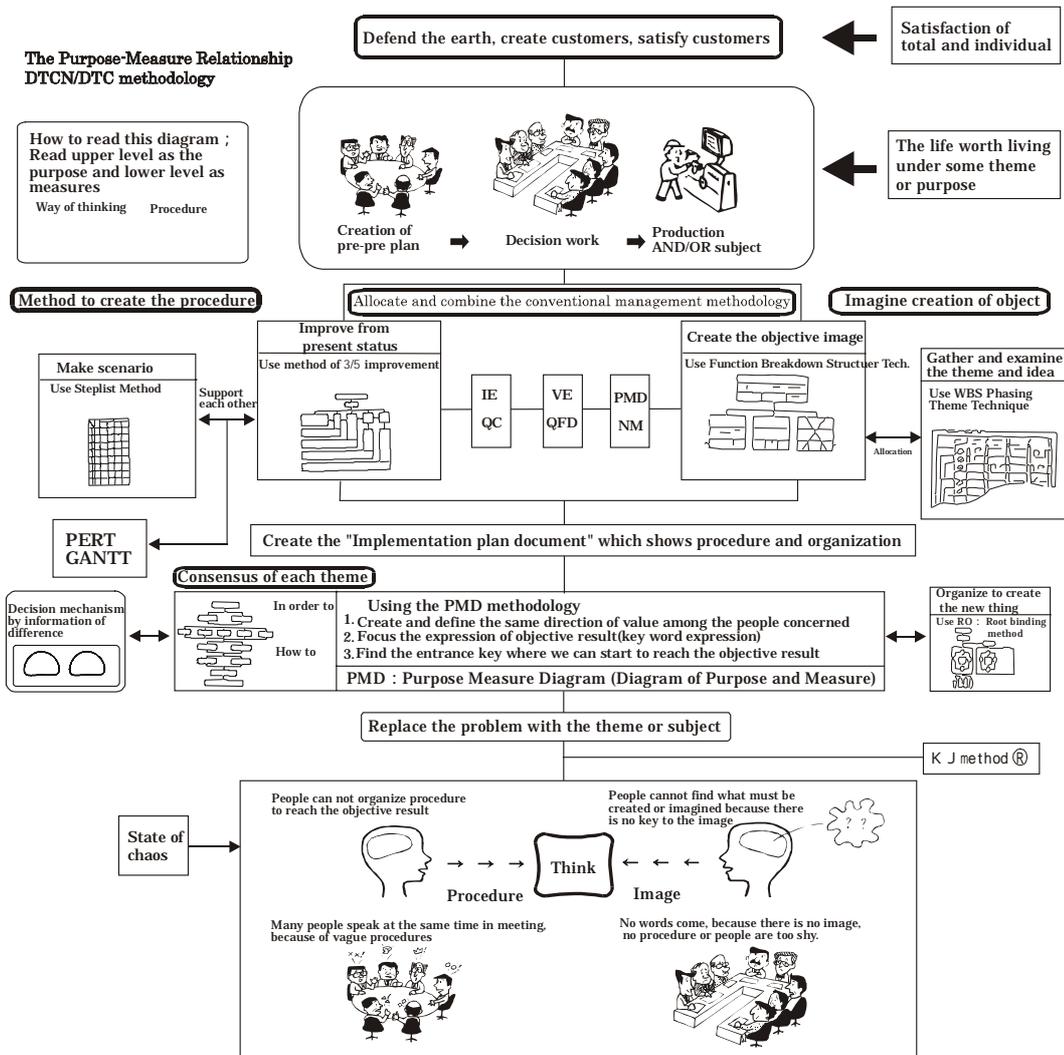   (3) To use a tool to develop applications of CALS

23. For people in charge of education (elementary school to university)

   (1) To use a tool for improving the creativity and concentration of elementary school and junior high school students

   (2) To use a tool for high school students facing university entrance examinations

   (3) For university students, to write thesis and acquire skills which will be useful after graduation

Fig. 0-2 The Purpose-Measure Relationship DTCN/DTC Methodology

The Purpose-Measure Relationship DTCN/DTC methodology

Defend the earth, create customers, satisfy customers ← Satisfaction of total and individual

How to read this diagram Read upper level as the purpose and lower level as measures

Way of thinking   Procedure

Creation of pre-pre plan → Decision work → Production AND/OR subject ← The life worth living under some theme or purpose

Method to create the procedure

Allocate and combine the conventional management methodology ▸ **Imagine creation of object**

Make scenario Use Steplist Method

Improve from present status — Use method of 3/5 improvement

IE QC   VE QFD   PMD NM

Create the objective image — Use Function Breakdown Structuer Tech.

Gather and examine the theme and idea — Use WBS Phasing Theme Technique

Support each other   Allocation

PERT GANTT

Create the "Implementation plan document" which shows procedure and organization

Consensus of each theme

Decision mechanism by information of difference

In order to   How to

Using the PMD methodology
1. Create and define the same direction of value among the people concerned
2. Focus the expression of objective result(key word expression)
3. Find the entrance key where we can start to reach the objective result

PMD   Purpose Measure Diagram (Diagram of Purpose and Measure)

Organize to create the new thing Use RO   Root binding method

Replace the problem with the theme or subject

method ®

People can not organize procedure to reach the objective result

People cannot find what must be created or imagined because there is no key to the image

State of chaos →

→ → → Think ← ← ←

Procedure   Image

Many people speak at the same time in meeting, because of vague procedures

No words come, because there is no image, no procedure or people are too shy.

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Acknowledgments (1984, 1997, 2001)

Owing to the above process, I'd like to make two acknowledgments corresponding to "A New Way of Thinking and Procedure for Design To Cost," and "Advanced Project Management Methodology (Thinking and Procedures for DTCN/DTC)"

Acknowledgment No.1 (1984)

On the occasion of the publication of "A New Thinking and Procedure for Design To Cost" from the Sanno-Daigaku Publishing Co.

I thank the executives of the Kawasaki Heavy Ind. Co., Ltd. for permission to publish this book to meet a social need, and Masatoshi Kasuya of the Sanno-Daigaku Publishing Co. for his efforts to make this book public. I also wish to thank the following in no fixed order.

- Masahiko Iwata, Director of the Airplane Division and the late Yuuhei Yoshitani, who taught me 14 years ago that the future of management technology lies in VE.
- The late Seiju Tamai and Hiroshi Tsuchiya, and Yoshio Nemoto of Japan Airbrakes for their approval to use the idea that developed into Steplist Management.
- Jiro Kawakita for his approval to utilize the KJ method as a means of developing techniques.
- The inventor of the NM method, Masahiro Nakayama, for his approval of developing these techniques in conjunction with the NM method.
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- Masaru Shichino, the late Kiyoshi Kumano, Kinichi Hattori, Kiyoshi Imao, who together developed the method of Steplist Management.
- Koushun Tsukamoto, Tomihisa Mori, and Hiroshi Hirata, who gave us a chance to make a study team and deploy the Steplist Method in practical use for creative management.
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of the Design to Cost Method through discussions, putting forth ideas to develop them and make them into the written picture and sentences.

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At Gifu

Michihiko Esaki