

1.2 Decision Mechanism using Information of Difference

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1.2.9 Summary

1.2.1 Introduction

1.2.1.a The purpose of this chapter

Rational management consists of achieving the desired objective by an optimal combination and use of available resources (people, material, money, time, technology, and information). In this operation, important aspects are rational decision-making and its associated judgment of action.

In this chapter, we explain the mechanism of decision-making we subconsciously use. To avoid misunderstandings, a very simple example is taken up. We describe a concrete method to fix onto paper the direction of value, a basic element of the mechanism. We further state the conditions for application to management, and an introduction to associated information collection techniques.

1.2.1.b Terminology in this section

(1) The decision made: Contents of the decision to take action

(2) Judgment of action: To judge whether an action is good or not.

(3) Decision-Making: The process of making a decision

(4) Direction of Value: Direction of value expressed by a Purpose-Measure Diagram

The relationship between action, decision and judgment: To take action, it is necessary to make a decision. To make a decision, it is necessary to judge.

1.2.2 Decision-making in a simple example

Suppose, as in Fig. 1.2-1, that we have two jelly doughnuts before our eyes which are exactly the same in appearance. We further assume that they are exactly the same distance from our hands. There would be hesitation for a moment over which one to choose. We may *imagine* that one has more jelly filling than the other, *differentiate* between the two, judging for action, and then pick up a jelly doughnut. This is the mechanism of simple decision-making. As seen from this example, we always seek an *appropriate information of difference* before action. In general, it is evident that no judgment of action can be arrived at if there is no difference or information of difference.

Another aspect is that choosing the jelly doughnut with more filling or less filling will depend on our sense of purpose and measure (called the direction of value of the actor). For example, as in Fig. 1.1-2, he/ she may eat lots of sweets *in order to* maintain his/her health, or refrain from eating sweets *in order to* maintain his/her health. We judge differences according to the sense (vector) of purpose and measure.

If we like filling and have no caloric problems, we would take the jelly doughnut imagined to have more filling. However, if we do have caloric problems, we would avoid that doughnut. We therefore see that besides information of difference, a purpose-measure axis is necessary. If we draw these relations, we obtain Fig. 1.2-3. Namely,

- (1) Judgment of action requires collation between the direction of purpose and measure, and the vector of information of difference .
- (2) For that, a vector of the purpose- measure relationship is necessary,
- (3) and also the information of difference to be checked against it.
- (4) To obtain the information of difference, a comparison is necessary,
- (5) and the comparison requires setting up either two or more plans or a standard and a plan .
- (6) When judgment of action is completed, action, or the next thinking starts .
- (7) Whether or not to eat the jelly doughnuts also constitutes two comparative plans.

From the above, it becomes clear that in order to make an appropriate judgment of action,

it is necessary to have the information of difference by comparison. This is regardless of whether the *direction of information of difference* turns out to be positive or negative with respect to the *direction of value* of the actor.

However, we should note that even if this mechanism is clarified, there is a *tendency in government or among industry personnel to act based on an opportunistic information of difference, and an opportunistic direction of value* for themselves, instead of acting for the true customer of a firm or an office. There are strong demands to combat this tendency. In other words, unlike the simple case of jelly doughnuts, a systematic method becomes necessary in the world of management to avoid creating a fictitious *information of difference* or an easy-going purpose-measure relation which diverges from its original essence. (For example, one may omit a measure of investigation into an important problem because it is bothersome, or put one's own comfort before the needs of customers.)

Fig. 1.2-4 is a diagram rearranging the elements of Figs. 1.2-2 and 1.2-3 according to the relation of purpose and measure. If we read this figure from top to bottom only as a purpose-measure sequence "in order to do something, its is necessary to do something," it becomes even more evident that, for thinking or action or their commencement, the priorities are making the relation of purpose and measure (vector of the direction of value), and setting up either two or more plans, or one plan and a standard.

If we further generalize this diagram of purpose and measure, we arrive at Fig. 1.2-5. If we read this diagram from top to bottom, it becomes an expression of "a way of thinking" indicating the relation between purpose and measure. If we read from bottom to top, it expresses the relation between measure and result, i.e., a rough procedure. (The difference between a rough procedure and a faultless procedure will be explained in Chapter 2: Basic Methods of DTCN.)

1.2.3 How to create a Purpose-Measure Diagram, which shows the direction of value for decision-making (cf. Fig. 1.2-6)

When we talk, think, or act, we always have a subject or theme. Let us start from this subject or theme.

We assume that the subject or theme is given, or self-imposed. We know from experience that expressing the subject matter in a somewhat abstract or summarized form is often useful in arriving at a judgment of action. However, the procedure/technique of making this summary have remained unknown. Here we shall give it.

When people gather and feel that they have thoughts in common, it takes time to come up with a joint view as an abstract expression or Key Point. One example is when a meeting does not get into focus. In such a case, a compact and time-saving summary becomes available with the methods below.

We first present a paper (most of the original) by the author to create a Purpose-Method Diagram for the summary discussed above.

Steps for making a Purpose-Method Diagram

- (1) A subject or theme, or task is presented. It may be given or self-imposed by the individual or group concerned.
- (2) Ask two questions regarding the subject or theme: "In brief, what are we trying to do with it?" and "In brief, what should we at least do?" Write down answers on paper in the form "In brief, it's 'doing A to do B,'" using nouns and verbs. A minimum number of adverbs and adjectives (words or phrases) may be added to these expressions.
- (3) By association, write down further sentences: "doing A to do B" on paper until all possible expressions are exhausted.
- (4) Cut the paper so that each expression is independent.
- (5) Arrange the expressions so that "in order to do what" is upward and "how to do" is downward as in Fig. 1.2-6.

In more detail:

First, take two expressions at random and place them on the table. Reading them aloud, determine which is better up and which is better down, according to the sequence "in order to

do what”-“how to do.” Add another expression, and again determine the order according to your impression. Remember that what is placed upwards is the purpose and what is downwards is the measure. Repeat this operation, and arrange all expressions in a vertical form repeating “in order to do A, it is necessary to do B,” “in order to do B, it is necessary to do C.”

(6) If an expression appears which does not fit into the vertical form in any way, arrange it horizontally, and repeat the steps above.

(7) After finishing the arrangement, check, by reading aloud, whether any expressions are missing vertically or horizontally, and whether any should be rephrased, and make the necessary revisions and additions.

(8) Fix the final arrangement with transparent tape on a large sheet of paper. (Do not use adhesive tape as it changes with humidity.)

(9) Among the expressions, find one which is at the most appropriate level to include the meaning of its upper level expression and its lower level expressions for the subject. Strangely enough, this usually appears around the middle level. If such an expression cannot be found, create one. This is the focal expression for the subject, and we call it the Key Word for the subject.

If we actually prepare such a Key Word at the beginning or in the preliminary phase of a meeting, later operations become surprisingly smooth. This is the mechanism of smooth decision-making. We call the column of expressions the Purpose-Measure Diagram (PMD) in this methodology.

The order of the purpose and measure in the PMD is an expression of the direction of value of the people involved, and the method above draws this out onto paper. Once it is drawn out, the direction of value can be checked by outsiders, for example, for social benefits. Also this method is a mechanism for solving a problem previously mentioned, namely that people in charge in government and industry often act on the basis of opportunistic information of difference and opportunistic direction of value, rather than serving the customer.

The above summarizes the way to clarify the relation between purpose and measure, and discover or identify the Key Word for the subject. The detailed method of using this mechanism is given in Section 2.1, "Application Examples of PMD Method," and in Chapter 3. We may also interpret the expression "view of value" as the collective directions of value for various themes and subjects (cf. Fig. 1.2-7).

1.2.4 Necessary conditions for making decisions in management

If we make a PMD (Purpose-Measure Diagram) for the subject "Essential conditions for making decisions in management," we arrive at Fig. 1.2-8. The Key Words in this PMD join the abstract expressions in the upper levels and the measure expressions in the lower levels, and are surrounded by thick lines. Hereafter, we take up these Key Words to grasp the necessary conditions for making decisions in management, starting from the blocks on the left of the figure.

Block No.1 shows the necessity of creating a block diagram to clarify "the direction of value" by the purpose-measure relationship as explained previously.

Blocks No.2 to No. 6 show the necessary items to produce the information of difference to be collated with the direction of value.

In more detail, No. 2 deals with creating two comparative plans to extract information of difference, and notes that the plans must be realizable.

No. 3 and No. 4 show the necessity of simultaneity and weight assignment to compare the above two plans at a common level.

For example, the same ¥1000 is worth something different this year and next year because of interest. If the annual interest rate is 10%, ¥1000 next year is actually ¥910 with the interest deducted.

Weight assignment can also be understood in the example of marriage, where factors such as figure, intelligence, and health enter. The weighing of these factors differs from person to person, and assigning a weight means that each factor is multiplied by a weighting coefficient. If two candidates for marriage are present, each factor of the two is evaluated,

multiplied by the weighting coefficient, and the candidate with the greater sum is chosen as leading.

Block No. 5 shows that correct information must be obtained to make a comparison. Direct information through one's own senses, such as sight or touch, is accurate, but information from others is less so. Also the quality of information differs whether one gathers it on purpose or not. We also know from experience that gathering information is much more efficient when one has a purpose in mind.

For the next block, No. 6, "Persuasive forecast," we draw on the story by Han Fei Zi, "Three people make a tiger in the marketplace," to explain the mechanism whereby people believe in a particular piece of information.

In ancient China, there was a king of Wei. His servant Guang Gong came to him, and initiated a conversation. "If someone said that a tiger was out in the marketplace, would Your Majesty believe it?" "No, I wouldn't." "What if another person said so too, Your Majesty?" "I might." "If one more said so, Your Majesty?" "I would."

A similar thing can be said on the basis of statistics. We may note however that the story also warns us of being too easily swayed when making a judgment of action; that is, judgment also calls for independence.

Let us rephrase Han Fei Zi's story and bring it more in line with our previous analysis.

If there is only one piece of information about an object, its reliability is unclear. However, if two similar pieces of information are available, we can estimate the range from the mismatch of the two pieces. If there are three pieces, the width of error can also be estimated (Fig. 1.2-9).

If the three pieces of information complement each other, reliability increases. With four or more pieces, reliability increases further. If we can add direct information by sight or touch as a check, we can get maximum reliability.

Block No. 6 is about obtaining persuasive forecast information. In decision-making, an element of forecast enters, such as "what happens if we do this," or "A is likely to happen, so let's do B."

Therefore, persuasive forecast becomes necessary. This will be explained in more detail in the next subsection.

To summarize this subsection, the necessary conditions for a rational and speedy judgment of action in management are the following:

- To achieve the purpose of management, make block diagrams of purpose and measure.
- To make judgment of action easy, acquire or prepare the factors given in blocks No. 2 to No. 6.

Hereafter, we shall call the conditions laid out in blocks No. 1 to No. 6 as the Six Conditions of Decision-Making for Action.

1.2.5 Persuasive Forecast

We briefly mentioned in the previous subsection that a persuasive forecast was necessary in judgment of action or decision-making. The detailed considerations are as follows:

First, if we consider what the forecast or the forecast value (hereafter both called the forecast value for simplicity) is worth, we realize it must basically serve as a standard for judgment of action or decision-making arising in management. Whether the forecast value is correct can be determined only if the actual value can be obtained. This means that when the forecast value is used in judgment of action, it is unknown whether the value is correct.

It follows that when we use the forecast value in judgment of action, we use it as a standard only by assuming that it is probable. Since it is unknown whether the forecast value is correct or not, we are merely using it as a standard supplemented with previous experience or knowledge, or with how the value was arrived at.

For example, let us consider the oil crisis of 1973, a major event towards the end of that year. If we suppose somebody predicted there would be an oil crisis in November at the beginning of the year, it is unlikely that the prediction would have affected anyone's judgment of action. Only if there was an element of persuasiveness in the explanation of the prediction, would people have taken action. We see that forecast values, regardless of

whether they turn out to be correct, are adopted on the basis of persuasiveness. Others which lack persuasiveness are of little worth. This is Persuasive Forecast.

Let us now briefly discuss the methods for making a persuasive forecast. One way is to use the mechanism of "Three people make a tiger in the marketplace" as explained in the previous subsection. Another is to divide the value into an absolute part (A), a part that can be estimated by changing its premise (B), and noise (C), and then provide an explanation for each part (cf. Fig. 1.2-10).

An important consideration for people working in industry or government who need to use forecast values, is one's position if the value turns out to be wrong. A government official, for example, may use the values in the Government Economic Forecast for the Upcoming Year adopted by the Cabinet and announced at the beginning of the year. (Note: The fiscal year of the Japanese government starts from April.)

The principle in the use of forecast values is thus to use authoritative values, or use values which allow one to fall on the safe side if the values turn out to be wrong. The central technique remains to take previous experience, and assign weights or combine them. The previous subdivision into A, B, and C parts is applicable as a check (Fig. 1.2-10).

It should be emphasized that one of the uses of persuasive forecast values is to supplement a sensitive purpose-measure relationship, thereby allowing a more accurate judgment of action. One application is as follows:

In general, the sales amount of a firm can be depicted as a right rising curve with time as the horizontal axis. The standard for the appropriate curvature is the following:

First, if a logarithmic scale is used for the vertical axis, the curve is, in general, almost straight for an average firm. We then plot the GNP in a similar manner. The two lines run roughly parallel. By looking at the parallel and diverging components of the sales with respect to the GNP, we may ascertain whether the growth of the firm is real or apparent. The parallel component is the A part, and the degree of divergence the B and C parts. This is thus an example of one method of making persuasive forecasts, i.e., division into A, B, and C parts.

1.2.6 A Method for easily identifying the information of difference

The above is the theory for the information of difference, the starting point for judgment of action. We now give a few examples of how to obtain the information of difference easily.

(1) Comparison of similar objects using photographs (the one-eyed method).

This method makes a comparison by taking a joint photograph of objects with similar functions from the angle where their functions are most manifest. When the photograph is ready, the information to be compared, e.g., performance or cost, is entered directly on it with a felt-tip pen. If we do this, we can easily comprehend the information of difference.

The principle behind this mechanism can be explained by two examples. First, look at your forefingers with both eyes open, and compare them, e.g., the difference in their size and shape. Next do this with one eye closed. The difference shows up more sharply. This is called the one-eyed method.

A camera has only one lens, and hence it is one-eyed. This is the basis for comparison using a photograph. The reason that extra information is directly filled in lies in the principle of information of difference plus alpha. If key information is united, both become easier to understand. An example of this is comics. Words appear directly alongside pictures, and quick understanding is possible. If we explain the principle of comics in terms of the brain, we can say comics work on both the left brain, which deals with words, and the right brain which deals with images, simultaneously, and that is the knack of making things readily understandable. This is the method of comparison using photographs.

(2) Improvement of visibility (Fig. 1.2-11)

We sometimes read newspapers and books, clip out articles or copy important pages, and file them. This makes us feel that we understand the matter better. This is because the file allows us to gather and bring together similar materials, making for easy comparison (Fig. 1.2-12).

Increasing the visibility of management material to make judgments for action easily means that we should utilize principles which allow the easy understanding of information of difference. In other words, we should compare objects at the same level (or on the same

plane), and create arrangements and standards which allow for easy comparison, the source of information of difference.

If we look at firms or institutions where the need for improved visibility in management is understood, they list out or draw the information on sizable boards. If fixed boards are insufficient, mobile boards can be used to make comparison easier. This principle should become important as computer screens become denser, bigger, and multi-windowed.

1.2.7 Card-making for comparing information

This method is an old one, but let us reconfirm its principles (Fig. 1.2-13). If one piece of information is recorded on each card, it is easy to rearrange or newly combine them, and extract the information of difference or the purpose-measure relation. This becomes the basis for various judgments for action or decision-making.

In the case above, pair-wise comparison is basic. This is because it is easy for people to compare two cards, but difficult to compare three cards, simultaneously. With two cards, the number of differences is one, but if one card is added, the number of differences jumps to three. If there is no information of difference between two cards, the information is identical or totally unrelated.

Another example is that pages are easier to understand when they are one-sided than when they are double-sided.

The Purpose-Measure Diagram "In order to do what?" and "How to do?" relationship, which turns up frequently in this book, also starts from comparing two cards, and positioning them. If the mechanism above is understood, other card-making methods such as the KJ method by Jiro Kawakita can also be changed and used effectively.

1.2.8. Purpose-Method Diagram for the maintenance of standard man-hours

Fig. 1.2-14 shows the Purpose-Method Diagram for the maintenance of standard man-hours. This diagram makes use of the A, B, and C portions and the information of difference. The Key Word level is the important starting point to compare rational man-hours and actual

man-hours.

1.2.9 Summary

Above, we clarified the mechanism of simple daily judgments of action and decision-making. It is a very simple explanation, but the author is unaware of any other clear exposition. We shall describe the process by which the author arrived at this mechanism and explanation, and use it as a summary as well for a future reference.

- (1) First he had the question about decision-making, "How is it done?"
- (2) While this question was on his mind, he was involved in R&D management. The goal there was to eliminate as much waste as possible, so one had to clarify the relation between input and output. This led to a prototype of the steplist management given in Chapter 2.
- (3) Then came the fact that, to go from one phase to the next in a steplist, a decision is required.
- (4) How should one make that transition?
- (5) There was the phenomenon that superiors have an easier time making decisions if two plans were submitted to them.
- (6) This led to the repetition "Why two plans?" "Why two plans?"
- (7) The question "What do two plans mean?" was also repeated. This question opened up a horizon.
- (8) Then came the realization that the two plans must be capable of being adopted or realized, and therefore impossible ones do not count.
- (9) "Two plans means a comparison." "To compare means to evaluate the difference." "As proof, when we compare prices, we compute the difference."
- (10) But then "What does difference mean?" Around that time he was somewhat overweight, so he was told "Don't eat sweets."
- (11) Oh, it's the difference between "To remain healthy, don't eat sweets" and "To remain healthy, eat sweets." Thus the purpose-measure relationship and the information of difference were connected.
- (12) Sometimes looking at a photograph makes understanding easier than looking at the real thing. The question "Why does it happen?" was also on the author's mind. The principle was found by thinking "A camera is one-eyed." "Let me close an eye." "It's just like looking at a

photograph." "Compare your forefingers using just one eye."

(13) The difference is more apparent with one eye than two. This observation developed into the method of comparison using photographs.

(14) Another observation concerned making cards to do something. During the process, it was noted that when the cards were arranged according to the purpose-measure relation, the key point became easier to grasp and the key expression often came in the middle. The hint for this was Ref. [1], which said that when doing something, the key expression is easier to find if the ladder of abstraction is organized according to "Why?" and "How to?"

(15) The subject then became how to make this easier for Japanese, and it was realized that one should switch over to "In order to do what?" and "How to do?"

(16) Taking the three lines of development stated above, the mechanism of decision-making based on the information of difference became apparent.

(17) The paper quoted in this chapter was written, and the material up to Item 1.2.7 was summarized in 1973.

(18) The term decision-making should apply to the whole process: Prepare two plans, create value, evaluate (= raise the value) to make the final decision or judgment.

Let us look at the above again. In the explanation, the question "Why?" is not used except when referring to proven matters. The paper in the next section, 1.3, will explain the proper use of "In order to do what?" "How to do?" and "Why?" It was written 11 years after Ref. [2], which was a development and clarification of the above, and also served as the basis of this chapter.

<References>

[1] Warren J. Ridge: Value Analysis for Better Management (1969) American Management Association, Inc.

[2] M. Esaki: A Method of Decision-Making for Management (1973) Proceedings of all Japan Management Association Conference (Zenkoku-Noritsu-Daigaku of Japan) in Tokyo.

Fig.1.2-1 Two jelly doughnuts, identical appearance

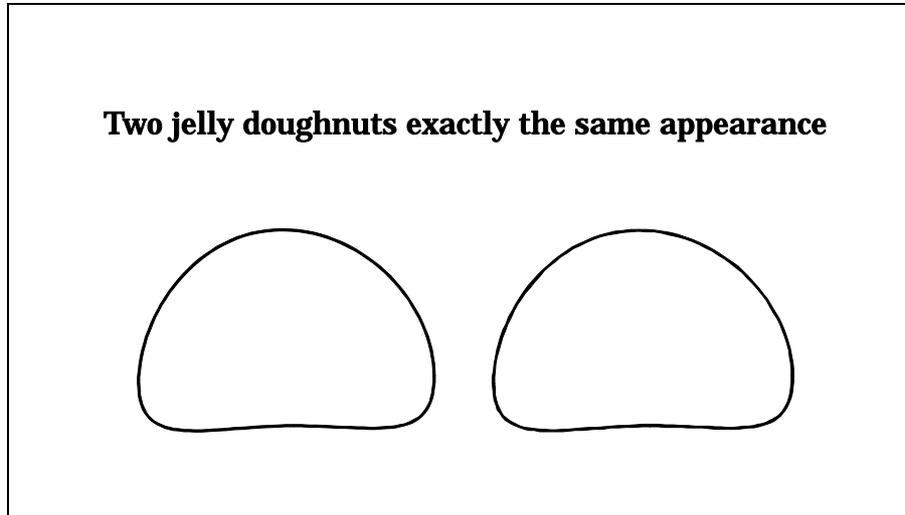


Fig.1.2-2 The relationship between purpose and measure

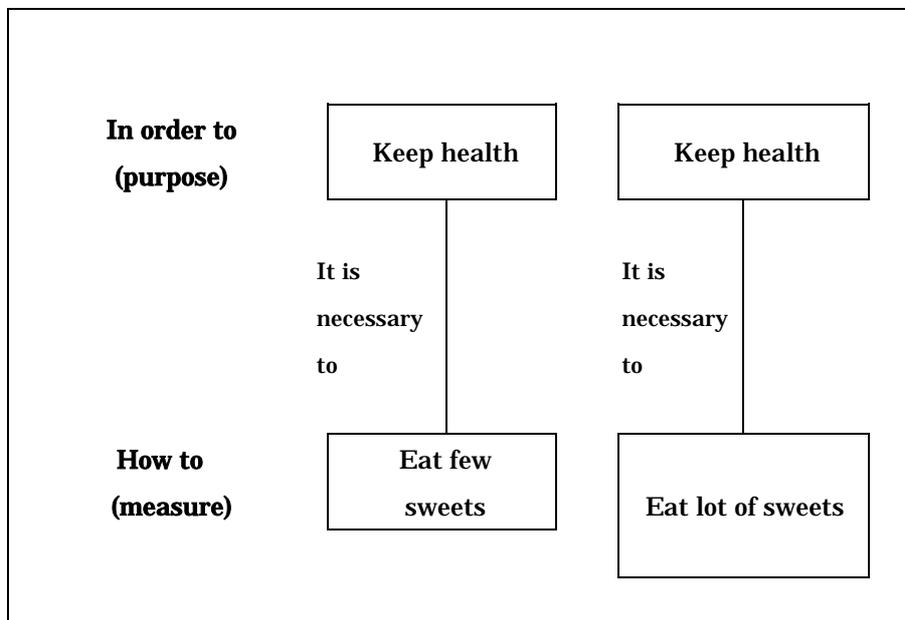


Fig.1.2-3 Flowchart of decision making process (JELLY DOUGHNUT THEORY)

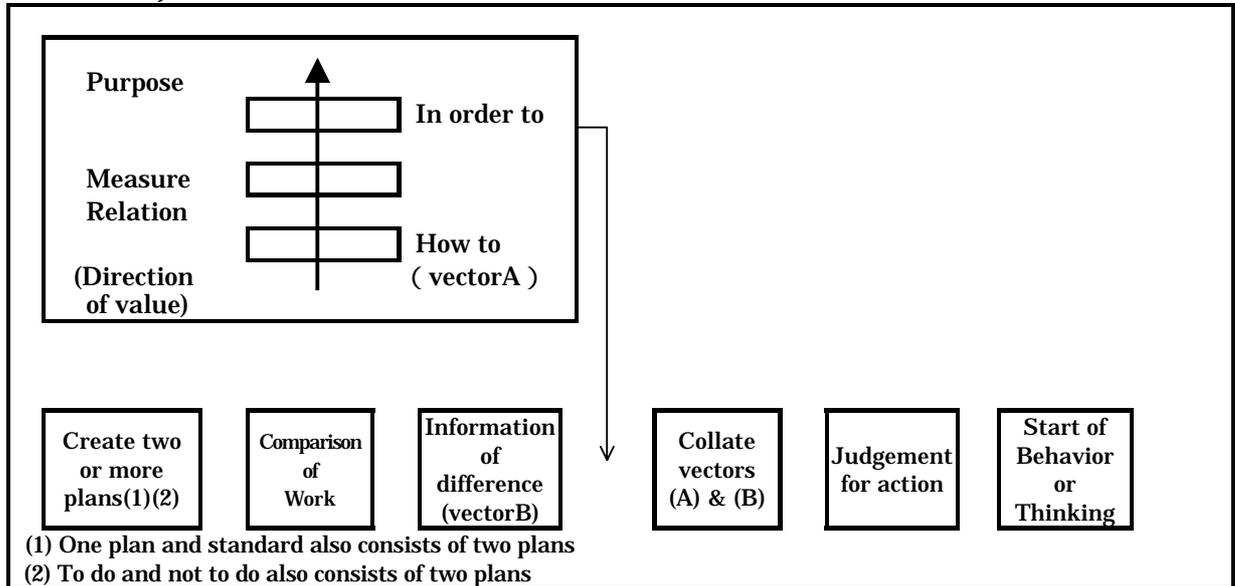


Fig.1.2-4 Purpose-measure diagram re-arranged from flow chart of decision making process

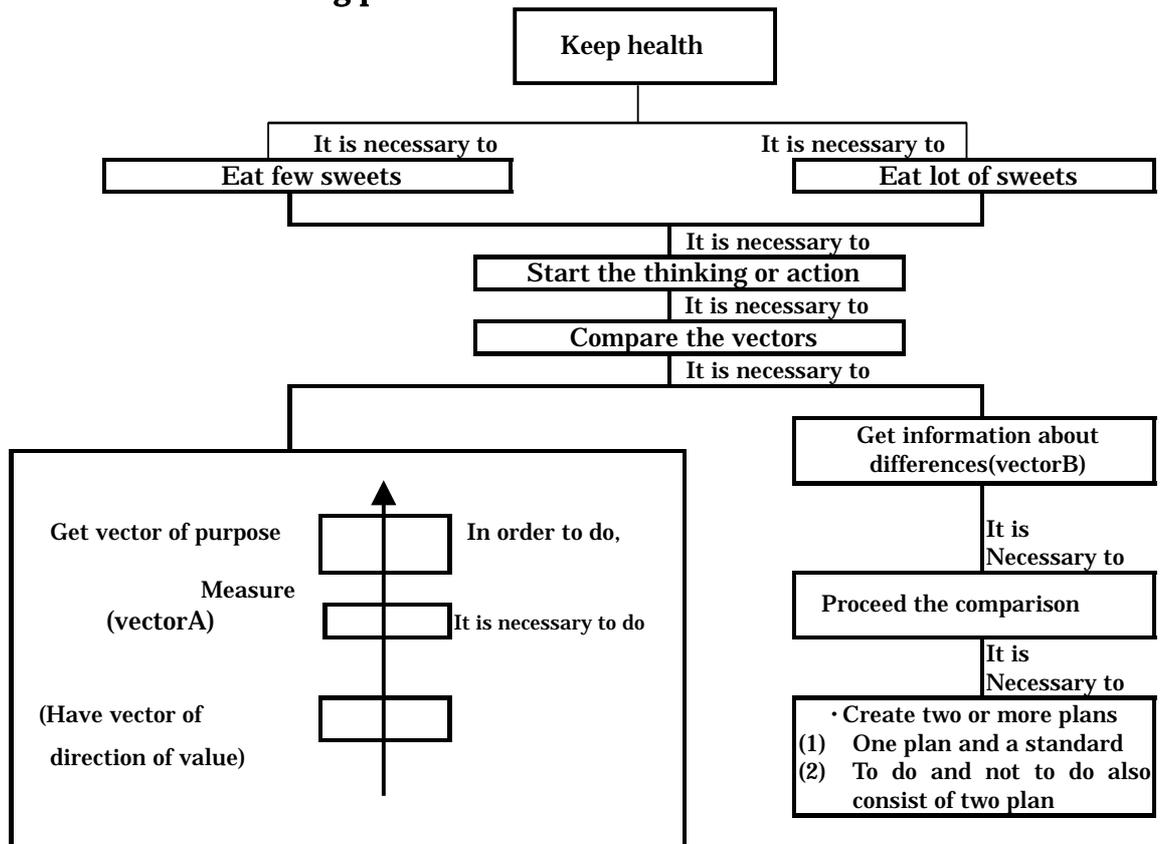


Fig.1.2-5 The procedure of thinking

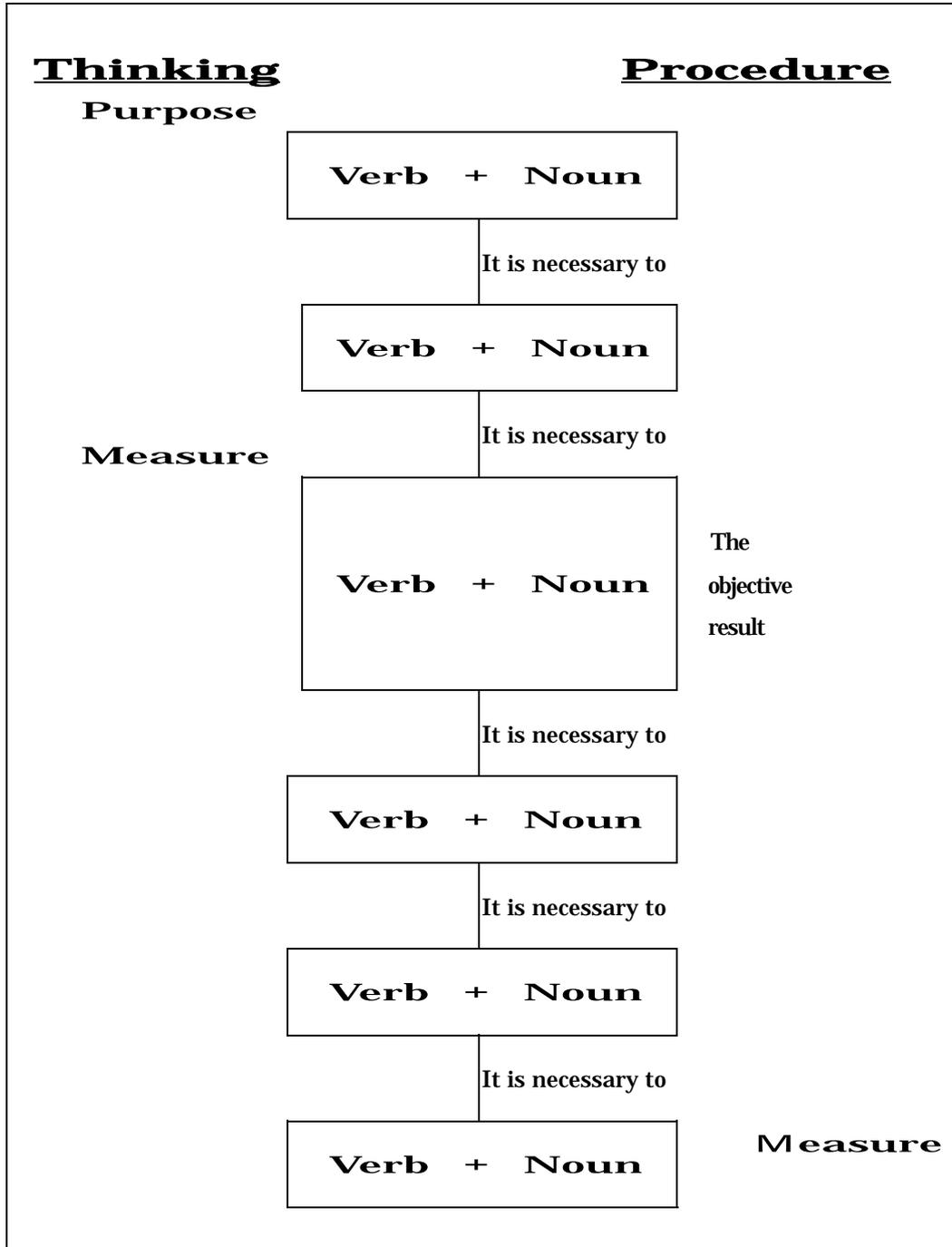
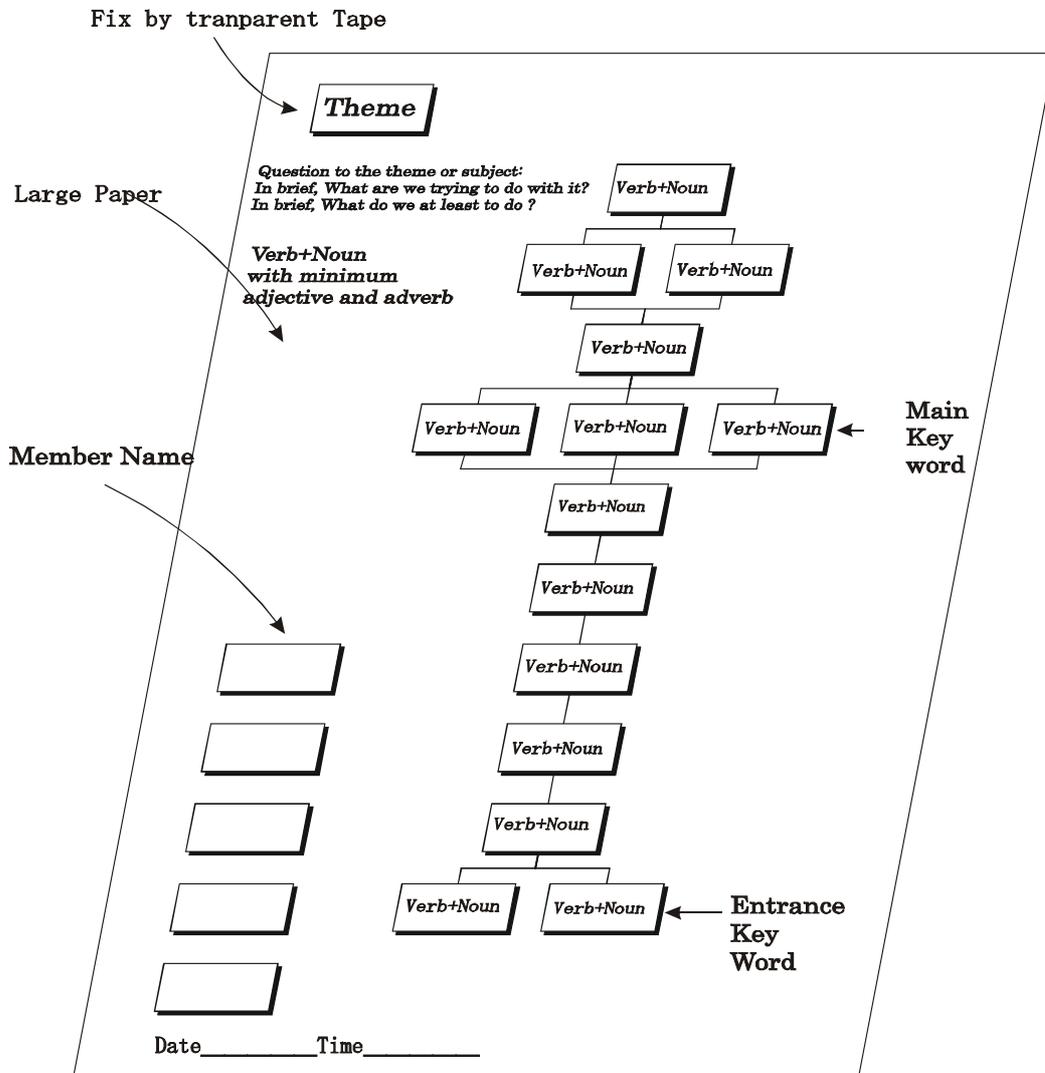


Fig 1.2-6 The layout of a Purpose-Measure Diagram on a large sheet of paper



Fix the arranged cards with transparent tape

The knack of fixing the cards by tape is to fix the cards at time after releasing the static electricity by smoothing by hand or chin.

It is recommended to use cards without adhesive because it is easier to move them around on the paper.

Fig 1.2-7 View of value: Looking at the PMD of many themes or subjects

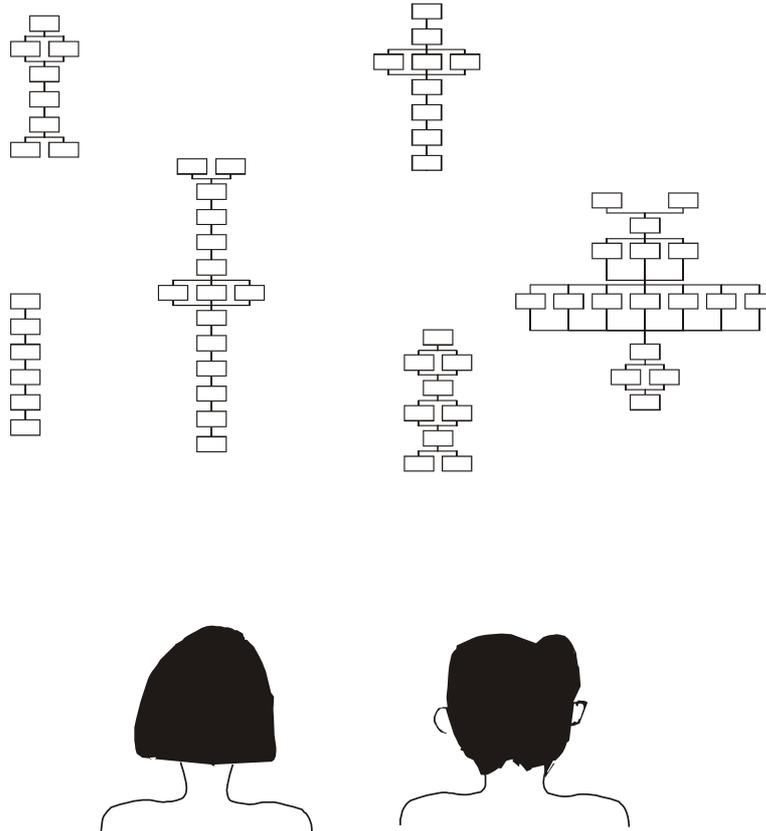


Fig 1.2-8 Essential conditions for making decisions in management

Purpose-measure diagram shows six required conditions for decision-making in management

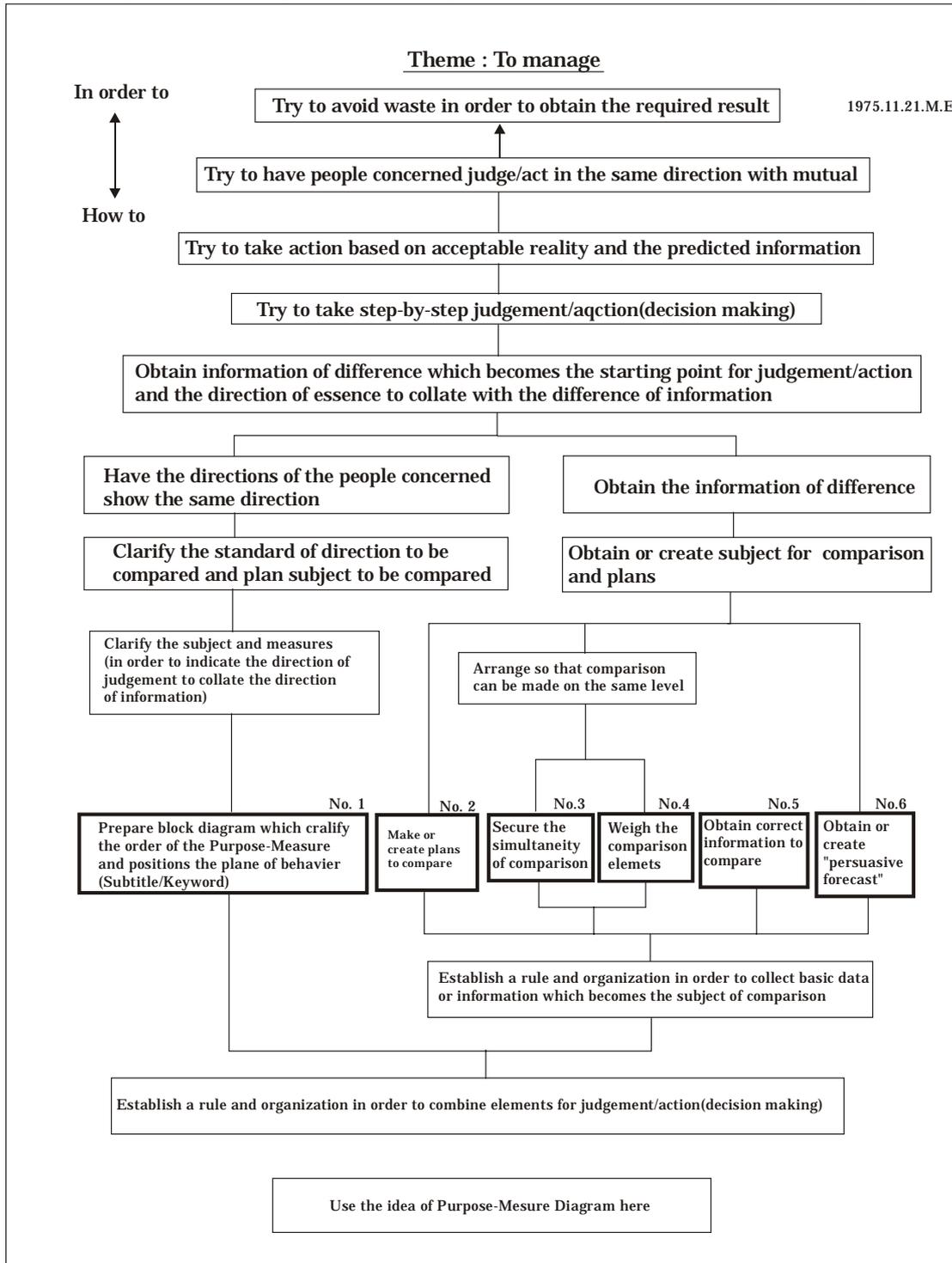


Fig 1.2-9 The information for persuasive forecast

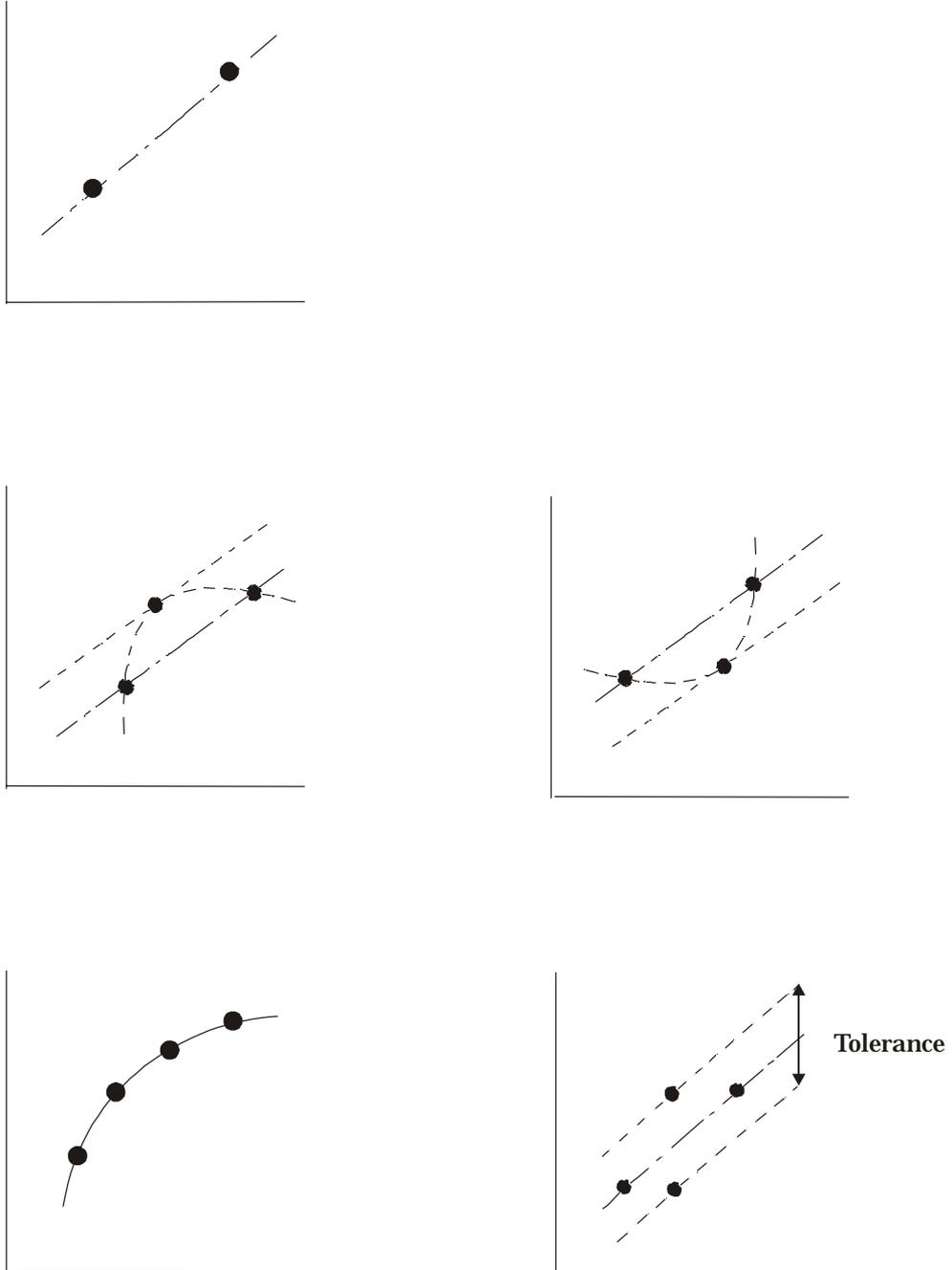


Fig.1.2-10 Forecasting value can be divided into portions, A, B and C

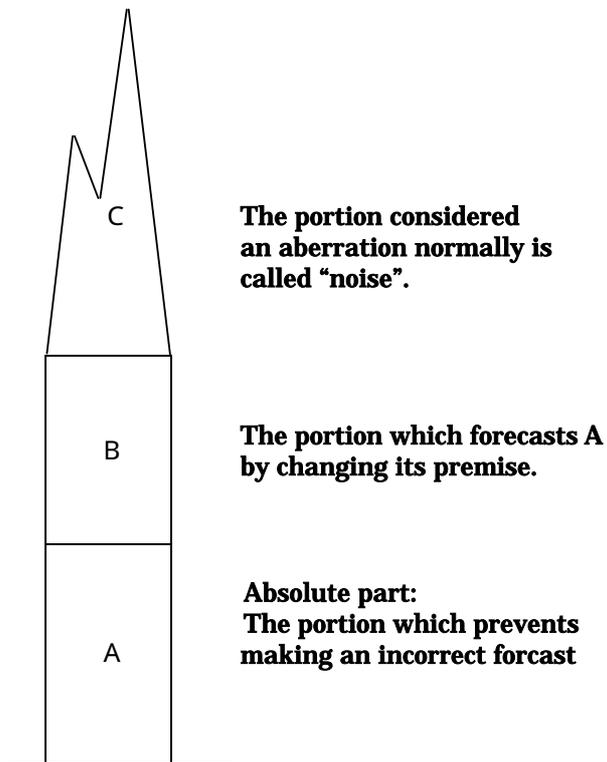
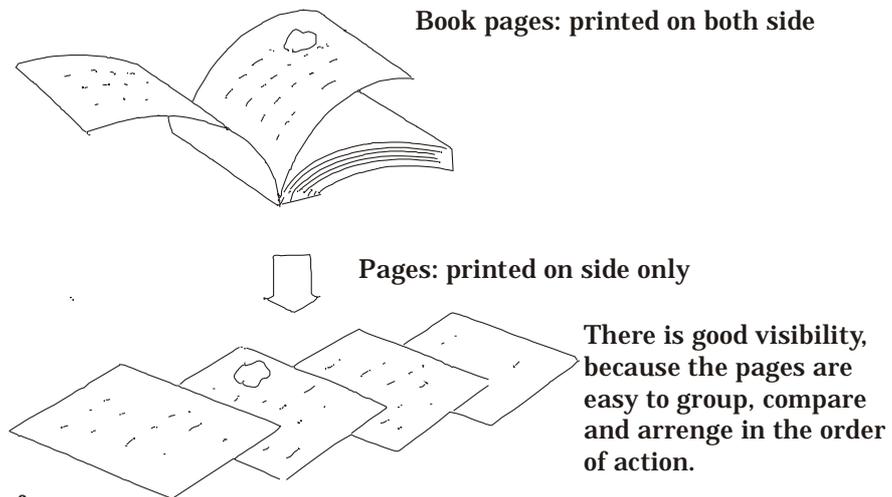


Fig.1.2-11 Economic forecasting by government for upcoming year

Dec.10	Forecast by economic planning agency
Dec.28	Understood by Cabinet council
Feb.20	Decided by Cabinet council

Note: The financial year of the Japanese government starts from April

Fig.1.2-12 How to improve the visibility



Note: Visibility refers to the ease with which things may be compared.

**Fig 1.2-13 KJ Method: Card grouping method
PMD method: Purpose-Measure Action Diagram**

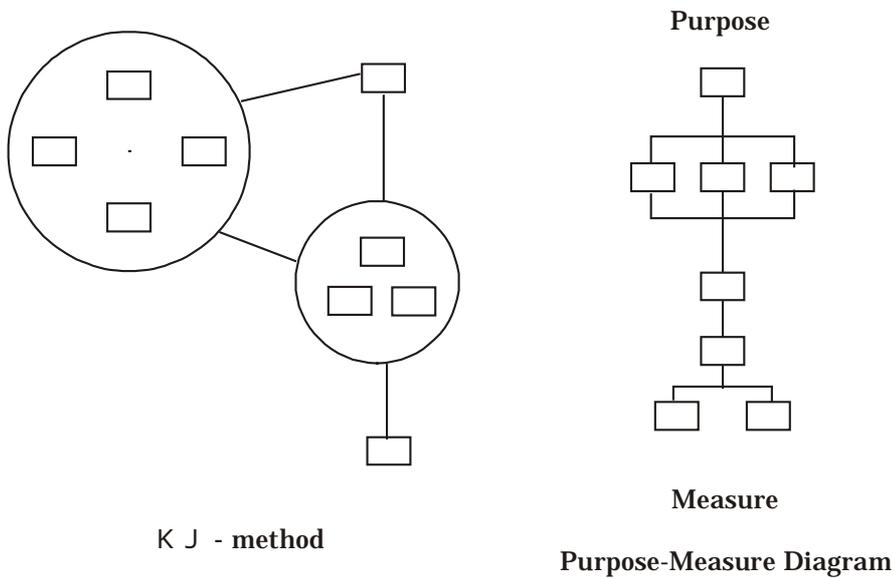
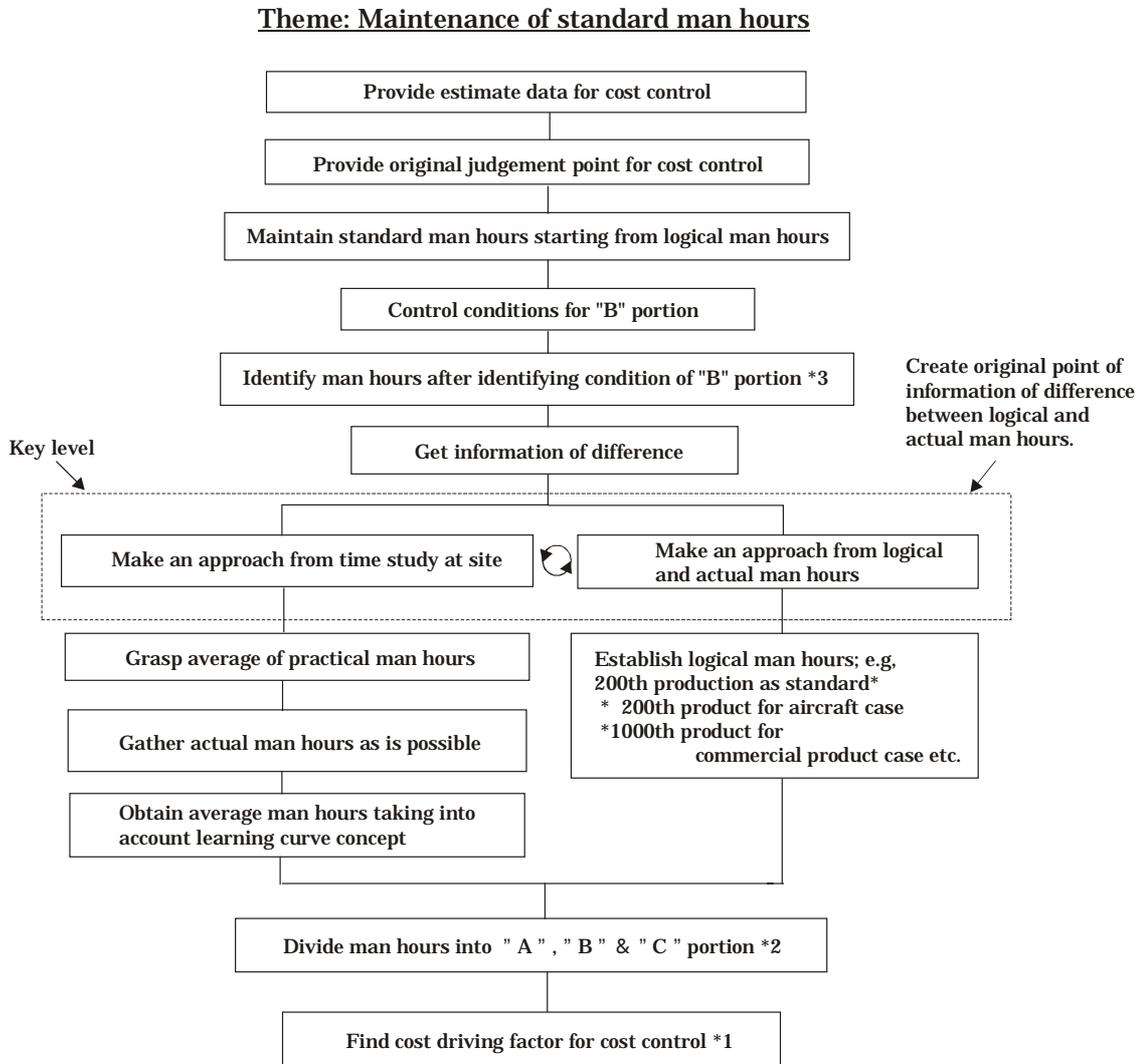


Fig.1.2-14 Purpose Measure Diagram "Why the maintenance of man hours is necessary?"



Note:

- *1. Cost driving factor means the element of conditional cost which changes when the conditions: are changed.
- *2. Divide man hours into three portions, A, B and C:
A portion is the one which is never changed;
B portion varies by changing the conditions(e.g. press forming and/or hand forming);
C portion is noise.
- *3. Therefore, cost control can be made only by concentrating the information of difference regarding B portion.