

Topics of research:

Research on Improvement of Design Process

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Background and Purpose

【 Subject of current design business 】

- ① Specialty, subdivision, and concentration of business
- ② Unfixed form and going side by side simultaneously of business
 - The design process and the result are vagueness and a designer asunder individuals.
 - It relies on designer's of some old-timers skill and tacit knowledge.
 - Old-timer designer and young man's polarization environments
 - Neither the design skill, the improvement and the solution pattern of the common manuals nor flow.



- **Making partially of design business Black Box**
- **Development belonging human that relies on individual's skill**
- **Sharing of design skill (tacit knowledge)**

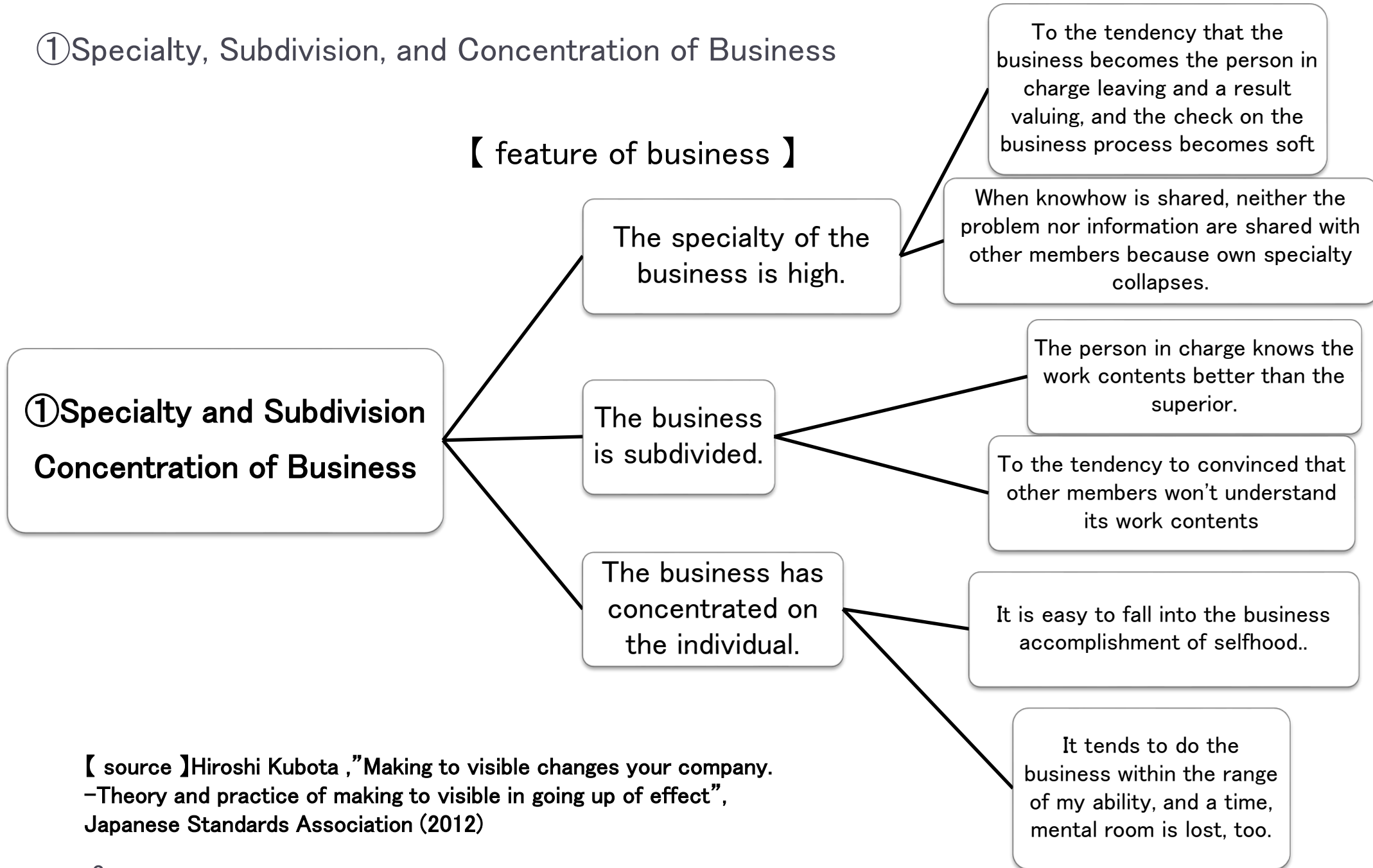
【 Purpose 】

→ It wants to **make tacit knowledge organization wisdom by making the design business visible**, and to contribute to the design **improvement and the improvement of a special skill.**

【 problem of business 】

① Specialty, Subdivision, and Concentration of Business

【 feature of business 】

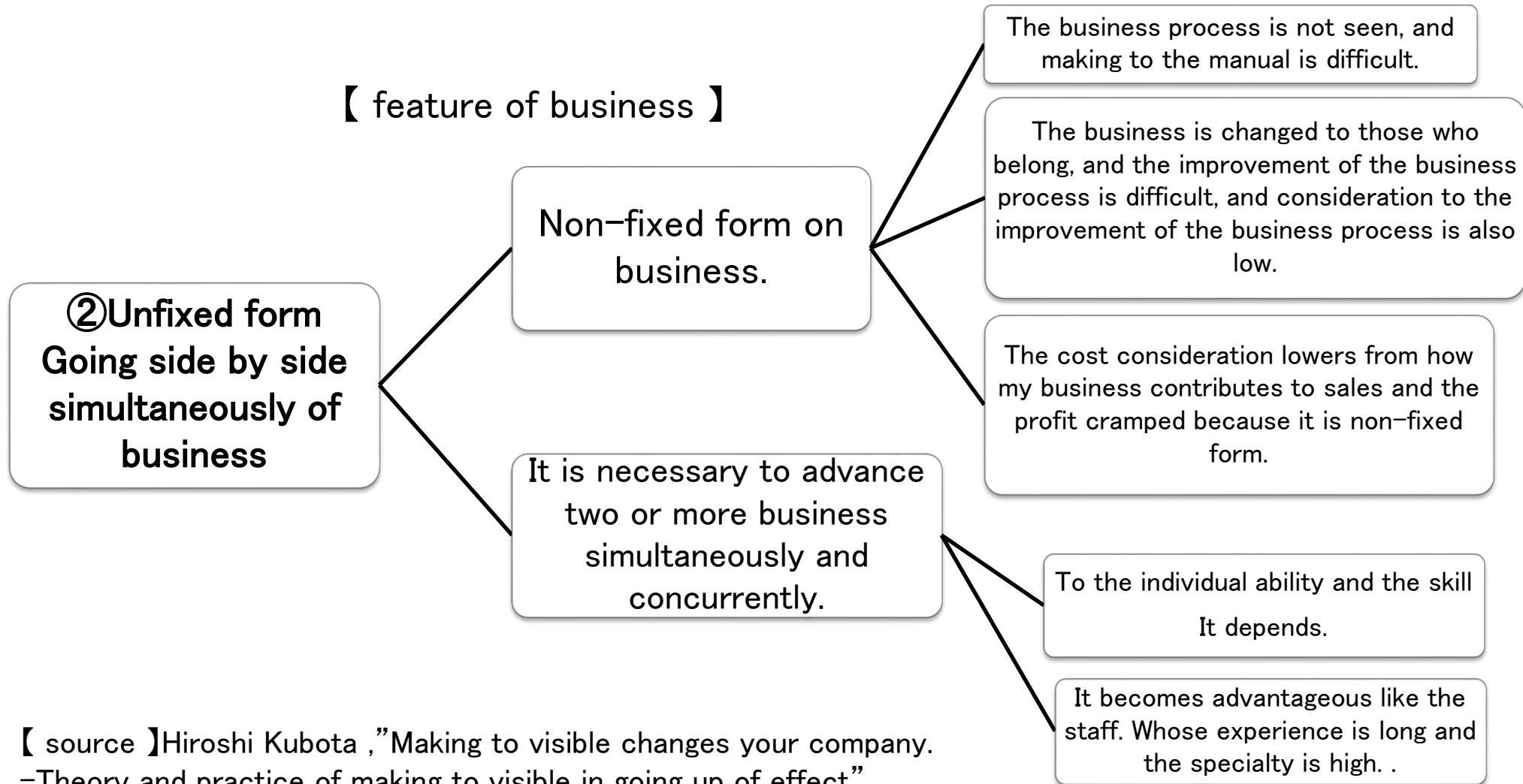


【 source 】Hiroshi Kubota ,”Making to visible changes your company.
-Theory and practice of making to visible in going up of effect”,
Japanese Standards Association (2012)

②Unfixed Form and Going Side by Side Simultaneously of Business

【 problem of business 】

【 feature of business 】



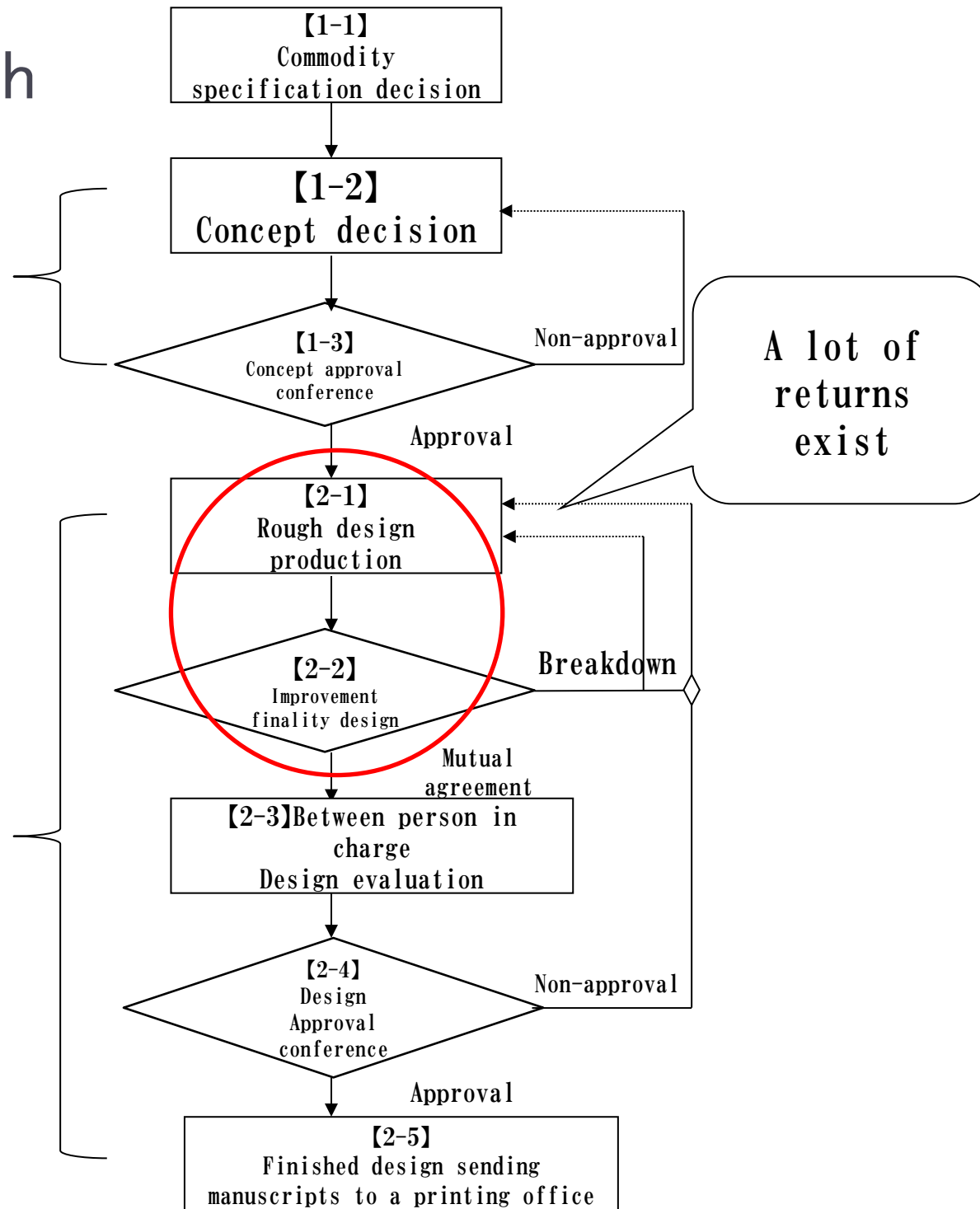
【 source 】Hiroshi Kubota ,”Making to visible changes your company.
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Object Area of Research

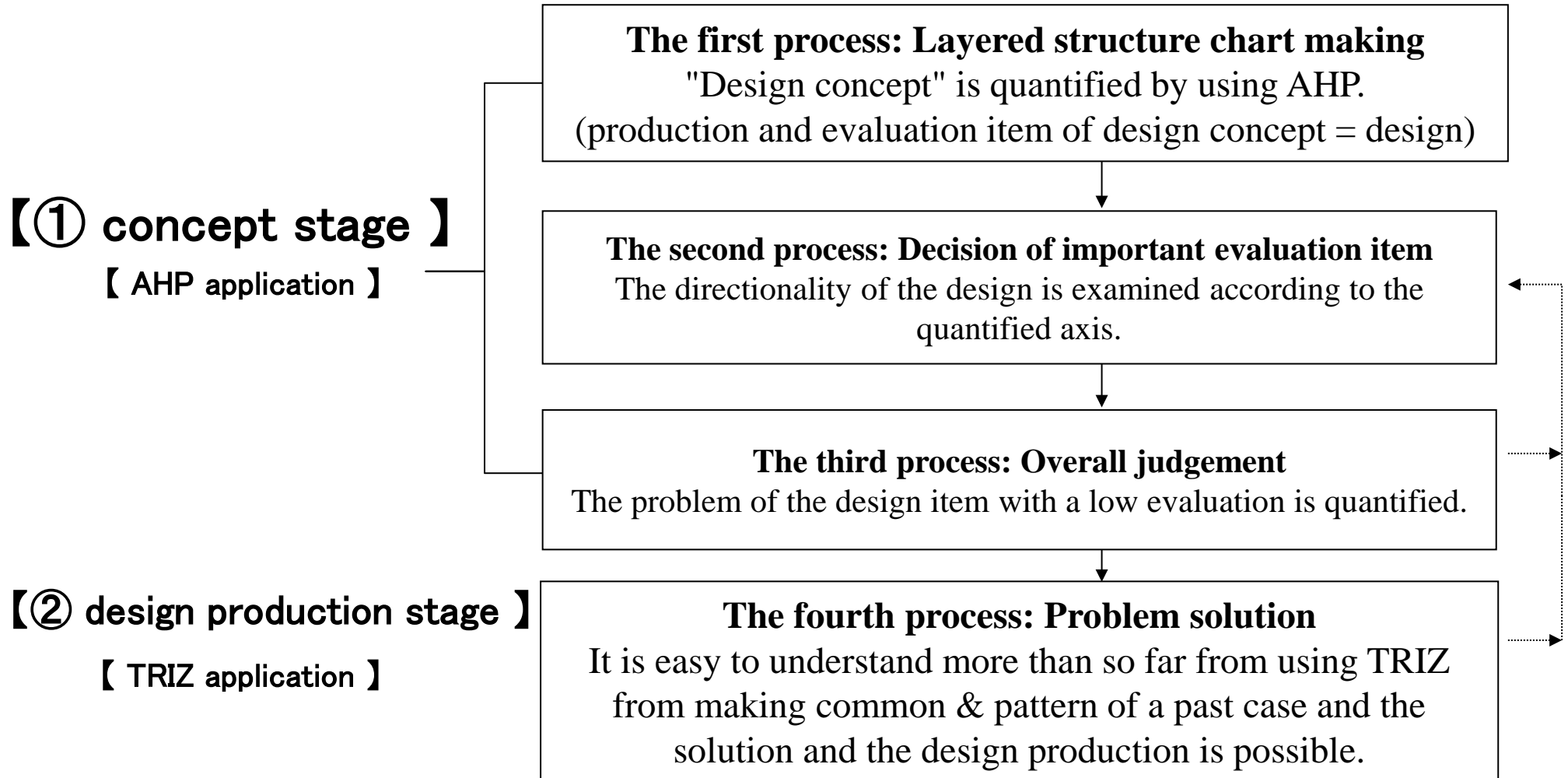
【① concept stage】

- The quantification of the design business, and the business arrangement and inventory by making to visible
- Proposal of the process model by whom engineered method is taken
- Plan comparison and designer of effect verification → sales performance
- The developer's questionnaire evaluation

【② design production stage】



Approach



① The evaluation item and the problem are quantified with AHP.

→② The problem is solved with TRIZ.

Case 1: Long Seller Set Commodity New Lineup Design

Evaluator: Old-timer skill designer

【 procedure 】 【① design concept stage 】

<1> Hearing by the skill designer who is achieving the sales budget in the past as for the evaluation item.

<2> The element that becomes the evaluation item of design is clarified and consolidated in nine.

<3> Weight it by skill designer about nine elements (priority level).

【② design production stage 】

<4> Design production of charge designer at current year based on the above-mentioned.

<5> The design idea is evaluated agreeing among the developers.

<6> The item with a low evaluation and the occurring design problem are quantified, and the improvement item is decided.

<7> The design problem with a low evaluation is solved and the improvement idea is produced.

Case 2: Food Package Design

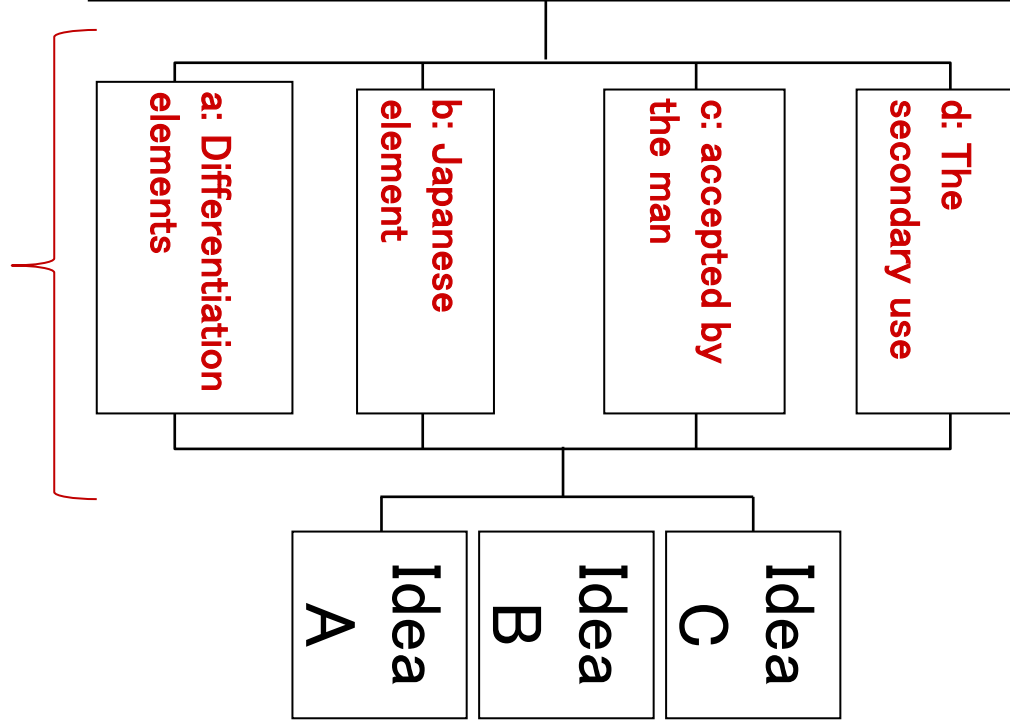
Evaluator: Career developer (The effectiveness of a different occupational category is verified).

【 procedure 】 It does basically as well as the procedure of case 1.

【① concept stage】

Selection of design idea to be able to expect sales plan number achievement

Evaluation item of design



Evaluation Criteria	a. Differentiation elements	b. Japanese elementes	d. The secndary use	c. Accepted by the man
Priority	1th	2nd	3rd	4th
Weit	0.590	0.238	0.123	0.049

→The most important design concept is
 “A: It decides it to the change feeling with another commodity”.

【① concept stage】

The most important design concept

a. It is a change feeling with another commodity, and the design production is done according to the axis.

【① concept stage】 Demand of design that became clear

“Five characters are taken to the layout.”

→The contradiction problem that reproducibility deteriorates because the area that can be designed is small occurs.

【② design production stage】 The problem is solved by using TRIZ (design version contradiction matrix and inventive principle).

【② design production stage】

【design version TRIZ】 The parameter is classified into “48→21→11” and it consolidates it.

CHARACTERISTICS OF DESIGN				ORIGINAL CHARACTERISTICS	
1	Shape of a design object	←	Length of a stationary design object Area of a stationary design object Volume of a stationary design object Shape of design object	←	4 Length of a stationary object 6 Area of a stationary object 8 Volume of a stationary object 9 Shape
2	Harmful elements for design		Harmful elements for design Design object Generated Side effects		30 Harmful Emissions 31 Other harmful effects generated by system
3	Impact of design		Impact of design Attractive		15 Force/Torque 18 Power 20 Strength
4	Color		Color		39 Aesthetics/appearance
5	Trend/Novelty		Trend/Novelty		18 Power 39 Aesthetics/appearance
6	Creation time/Schedule		Creation time Schedule		21 Stability 26 Loss of time 44 Productivity
7	Volume of design elements		Volume of design elements		10 Amount of substance
8	Design elements		Taste of design elements		25 Loss of substance
9	Quality of design		Quality of design		42 Accuracy of manufacturing
10	Perspicuity of design concept		Perspicuity of design concept		28 Loss of information
11	◎'s original design elements		◎'s original design elements		32 Adaptability/Connectability 35 Reliability

【② design production stage】

Design version TRIZ 【 contradiction matrix 】

It improves it.
To "Amount of the design component"
and "Area"
Refer to the problem settlement plan
of a similar item.

		1	2	3	4	
		o a S b h j d a e e p c s e t i g o n f	d f e H e o l a s r e r i m m g e f n n u t l s	d o I e f m s p i a g c n t	c o l o r	
1	Shape of a design object		1 3 13 35 17 11 5 7 40 24 15	10 17 35 3 19 12 14 40 1 13 2 37 9 12 28 6 30	3 17 32 7 14 26 22 5 35	
2	Harmful elements for design	17 14 4 35 17 4	24 3 15 5 30 7	10 3 15 35 28 4 18 40 17 5	17 7 10 5 2 28 24	
3	Impact of design	35 28 17 14 4 19	3 40 10 25 15 7	15 2 35 5 3 13 24 14 1 19 18 28 40 10	14 3 7 12 28 15 22 17	
4	Color	17 14 15 4 28 32	4 28 15 35 2 13	3 28 7 4 15 14 32 9 17 40 2		
5	Trend/Novelty	17 14 1 25 36 15	4 19 13 8 32 7 2	1 3 35 15 19 2 28 4 13	2 19 15 35 28 40 10 3 7 4 14 10 3 7 4 14 32 9 17 40	28 15 14 22
6	Creation time/Schedule	17 4 35 3 7 5 14 10	40 24 1 12 28 19 2	1 15 24 35 40 14 39 25 13 2	24 10 16 35 18 40 17 9 5 6 1 3 28 15 12 22	17 4 3 22 10 28 2 13 1
7	Volume of design elements	35 3 17 4 2 25 7 14	13	1 35 24 40 3 12	35 14 40 3 19 14 17 9	30 17 28 14
8	Design elements	17 28 24 10 5 30 4 3 39 35	13 2 24 35 3 1 15 14	14 15 9 28 25 3 40	13 28 17 4	
9	Quality of design	17 1 10 32 35 28 25 30 13	3 10 40 24 10 17 35 4	12 19 28 2 32 16 3 17 7 35	2 3 17 32 7	

【② design production stage】

【design version inventive principle】

→2 and 17 are applied.

【use inventive principle】

→ 2. Separation and extraction

Taking out of “Unnecessary part or element”
(removal and separation) of the design it.

→17. Another dimension

Let’s make the design of the single-layer a
combination of multilayer by the hierarchy
and put out the depth and the depth.

DESIGN PRINCIPLES
1.Segmentation
2.Extration
3.Local quality
4.Asymmetry
5.Consolidation
6.Universality
7.Nesting(Matrioshka)
8.Counterweight
9.Prior Counteration
10.Prior Action
11.Cushion in Advance
12.Equipotentiality
13.Do it in Reverse
14.Spheroidality
15.Dynamicity
16.Partrical or Excessive Action
17.Transition Into a New Dimension
18.Continuity of Useful Action
19.Convert Harm into Benefit
20.Feedback
21.Mediator
22.Self Service
23.Copying
24.Flexible Films or Thin Membranes
25.Changing the Color
26.Homogeneity
27.Rejecting and Regenerating Parts
28.Transformation Properties
29.Inert Environment
30.Composite Materials

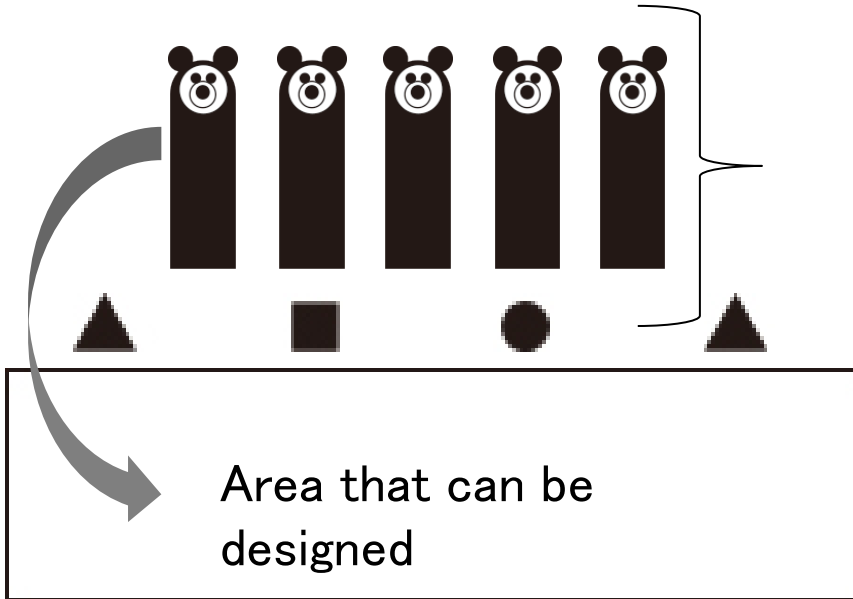
ORIGINAL PRINCIPLES
1.Segmentation
2.Extration
3.Local quality
4.Asymmetry
5.Consolidation
6.Universality
7.Nesting(Matrioshka)
8.Counterweight
9.Prior Counteration
10.Prior Action
11.Cushion in Advance
12.Equipotentiality
13.Do it in Reverse
14.Spheroidality
15.Dynamicity
16.Partrical or Excessive Action
17.Transition Into a New Dimension
18.Merchanical Vibration
19.Periodic Action
20.Continuity of Useful Action
21.Rushing Through
22.Convert Harm into Benefit
23.Feedback
24.Mediator
25.Self Service
26.Copying
27.Dispose
28.Replacement of Mechanical System
29.Pneumatic or Hydraulic System
30.Flexible Films or Thin Membranes
31.Porous Materials
32.Changing the Color
33.Homogeneity
34.Rejecting and Regenerating Parts
35.Transformation Properties
36.Phase Transition
37.Thermal Expansion
38.Accelerated Oxidation
39.Inert Environment
40.Composite Materials

【② design production stage】

- The design idea is abstract.

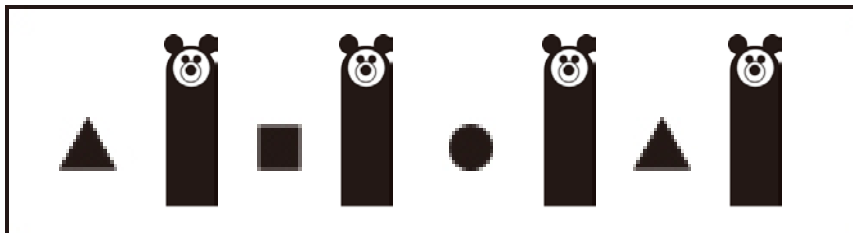
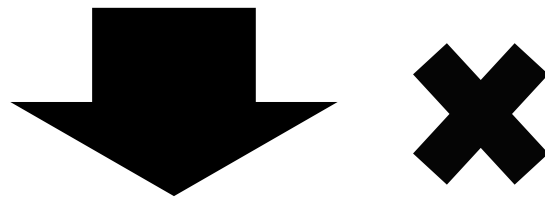
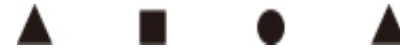
Demand of design:

Five characters are laid out.



【 design component 】

- Five characters
- Design indispensability element of



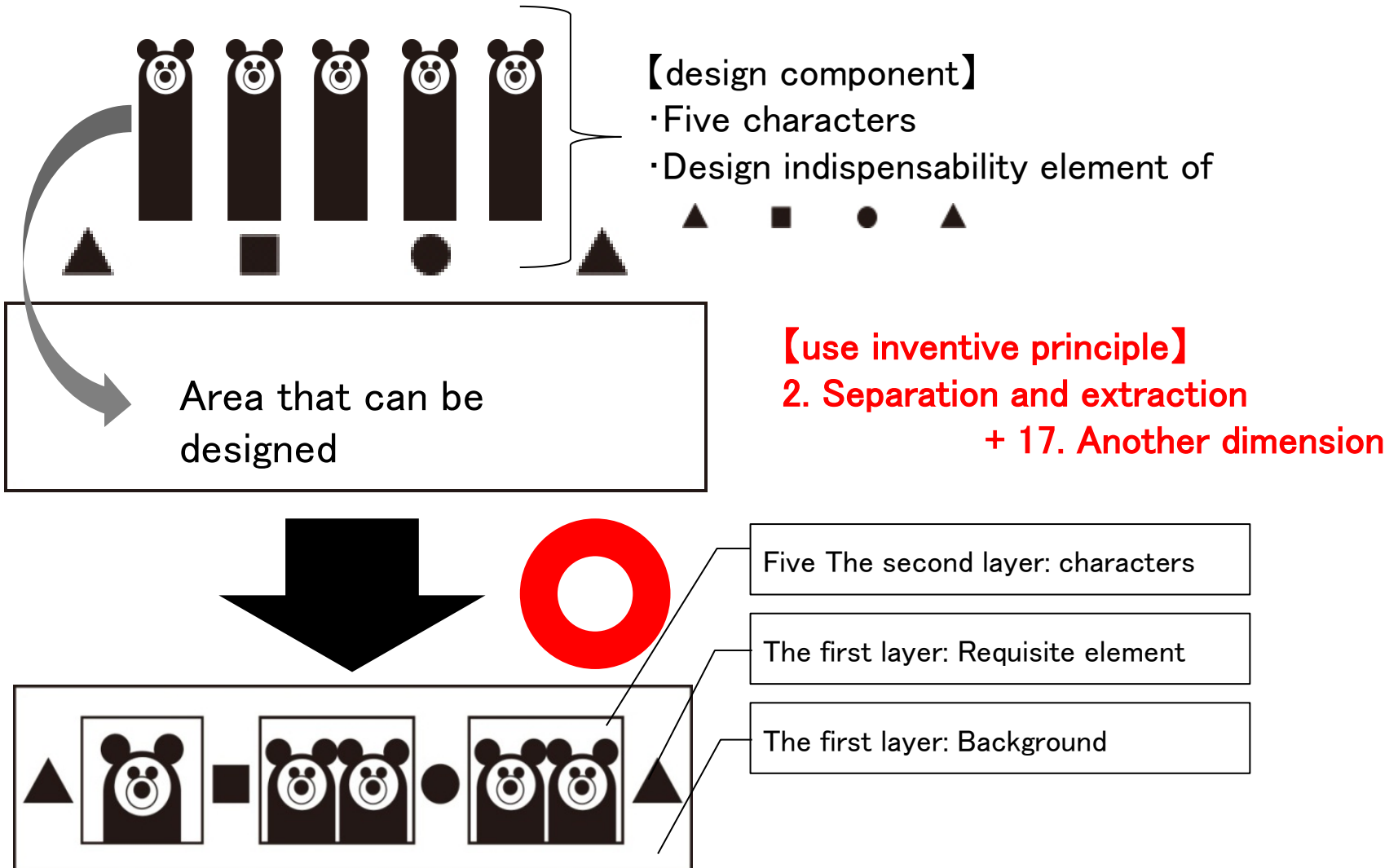
From the size that can be printed.
It becomes small and the print collapsing happens.

【② design production stage】

- The design idea is abstract.

Demand of design:

Five characters are laid out.



【② design production stage】

The demand of the design was filled.

Color variation A, B and C idea from which it differentiated respectively were done and production and the evaluation were done.

Evaluation Criteria	a.	b.	d.	c.	Total
	Differentiation elements	Japanese elementes	The secndary use	Accepted by the man	
Priority	1th	2nd	3rd	4th	
Weight	0.590	0.238	0.123	0.049	
A	0.411	0.172	0.081	0.034	0.441
B	0.063	0.017	0.010	0.006	0.178
C	0.116	0.048	0.032	0.009	0.379
Evaluation of A	1st	1st	1st	2nd	1st

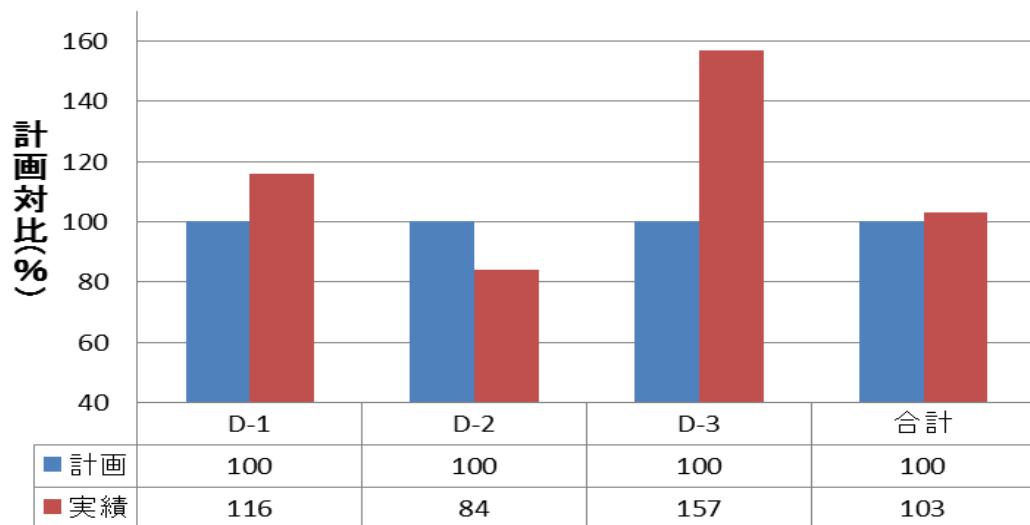
→ An idea became and the evaluations became high results most.

Sales Performance

- Because the specification and the condition are different from the commodity in the past, the verification of a comparison by the time series and statistical effectiveness assumes the sales performance for impropriety.

Case 1:

Plan ratio D-1: 116%, D-2: 84%, and D-3: 157%

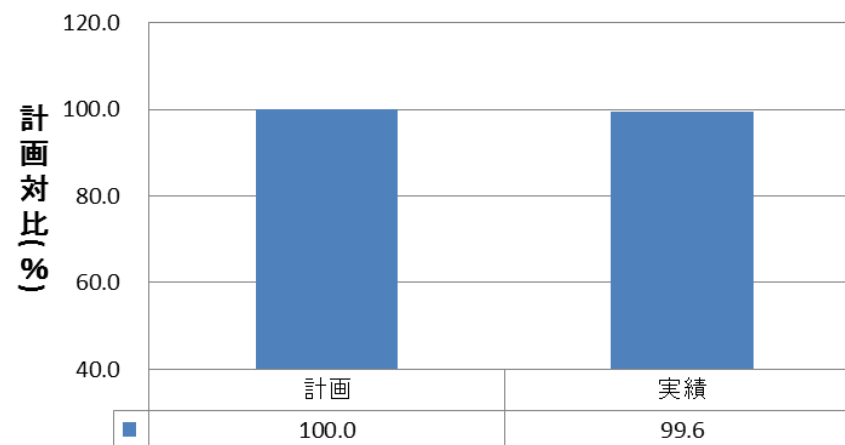


Because the purchase layer had not become a transition of on schedule differing from an existing commodity for D-2, it became Ram. The amount was counterbalanced by D-3's having exceeded the plan and achieved the plan as a whole.

Case 2:

100% compared with plan

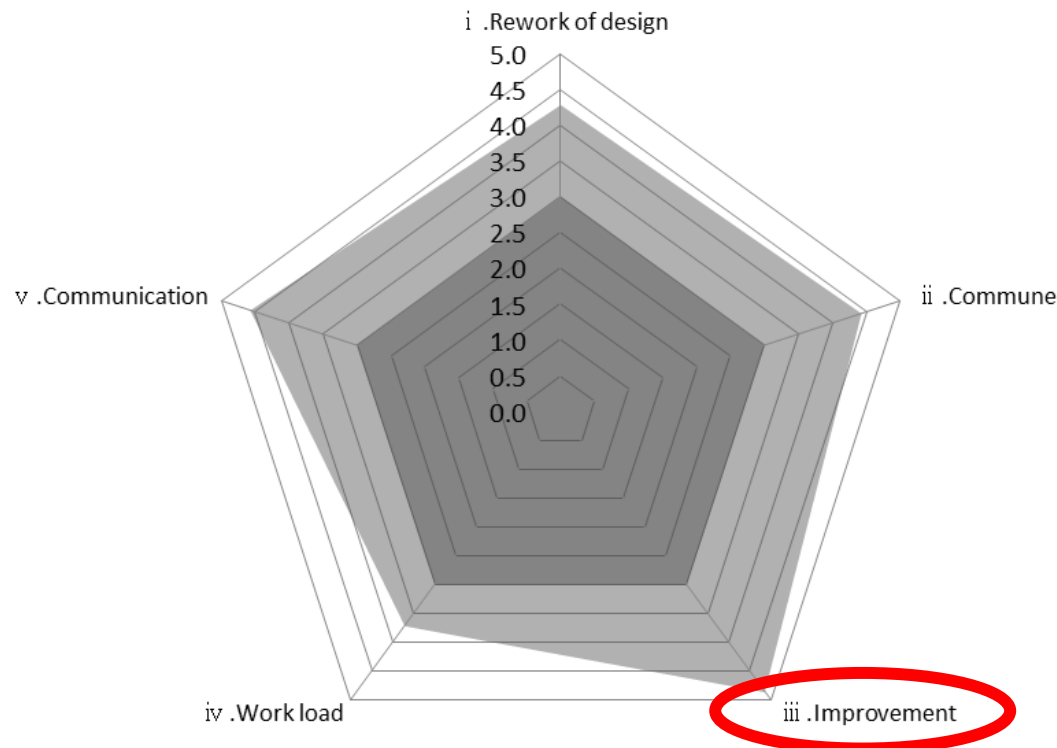
- 100% is not exceeded for a certain period only for the stock of sales.



The manufacturer returned goods rate of the wound and defective goods such as dirt is 0.4%. Stockout of early stage of sales more than plan

→ Cases 1 and 2 and sales plan achievement

Result of the Questionnaire



【 question item 】

- i . About the return of the design production work goods
- ii . About sharing the solution pattern of the design problem
- iii . About the foothold to provide designer's improving direction
- iv . Whether the understanding of this approach is possible at time that the load is not put on the current operation about
- v . About mutual understanding of the word and the process with the designer

【 respondent 】

- (seven development persons in charge)
- Executive job 1 (section chief of design group)
- Executive job 2 (those who approve design)
- Career-track job 1 (person in charge of brand management)
- Career-track job 2 (career-track job in charge of case 1)
- Career-track job 3 (career-track job in charge of case 2)
- Designer 1 (designer chief)
- Designer 2 (designer in charge of cases 1 and 2)

Consideration

The evaluation item of the design and the individual's production intention were quantified, and making the evaluation item and the design problem solution process that led to the design improvement visible became possible.

Future Tasks

- 1. About the ascertainment of a commodity for which the approach in the present study is suitable and a commodity not so**
- 2. About the consensus building of the evaluation of AHP**
- 3. About the operation method in the business of design version TRIZ**

Reference Literature

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