

The 9th TRIZ Symposium 2013 in Japan

Research theme:

Research on Process Improvement of Design Service of Character Goods

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Background and purpose of research

【 current design development task 】

- 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
- Decreasing of design quality and man power by absence due to illness, job change, and retirement
(the old-timer designer's group mandatory retirement after ten years)
- There are the common manuals and the flow for the design skill, the improvement and the solution pattern



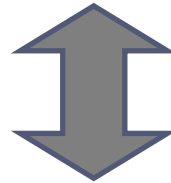
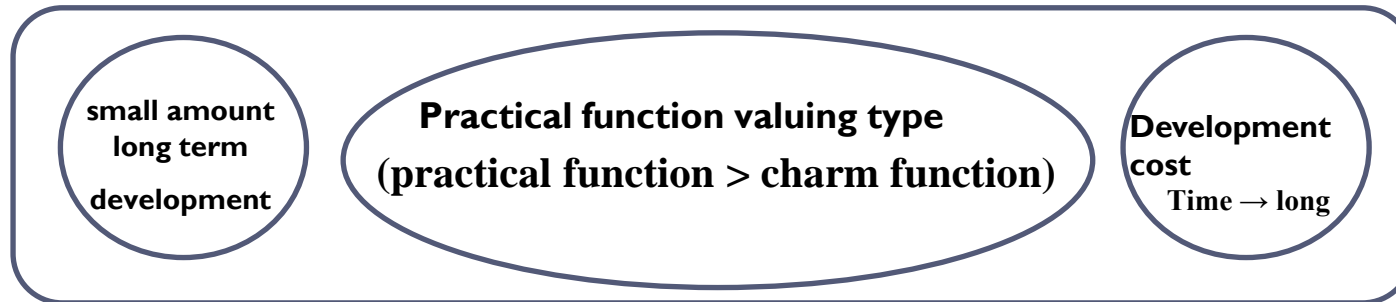
- ① **Making partially of design business Black Box**
- ② **Development belonging human that relies on individual's skill**
- ③ **Sharing of design skill (tacit knowledge)**

→I want to do high design production and the development of the transparency and reproducibility.

Commodity and project design researches in the past

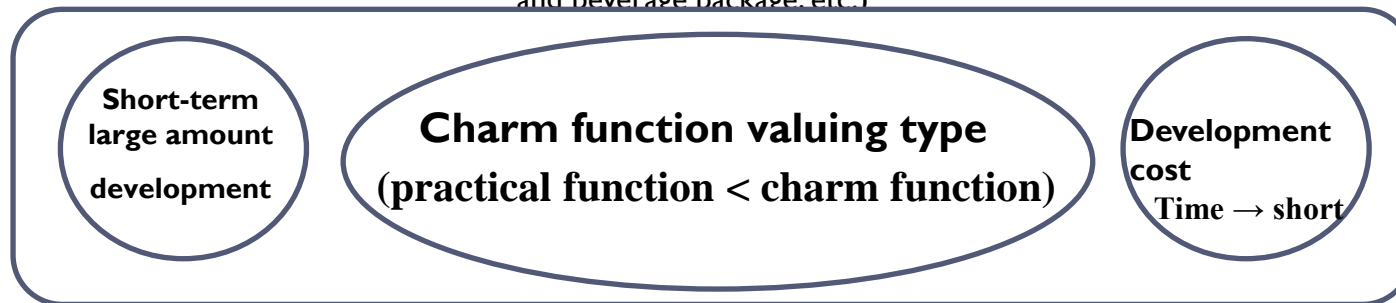
【 research in the past 】

(example . consumer electronic, car,
and endurance consumption material, etc.)



【 our company 】

(example . luxury goods design, products featuring popular characters,
and beverage package, etc.)



New QC outfit

- Harmony method (KJ method)

- Association chart

- System diagram , etc.

Multivariate analysis

- Factorial analysis, etc..

Idea conception and evaluation

- Analogy conception

- Brainstorm

- TRIZ etc...

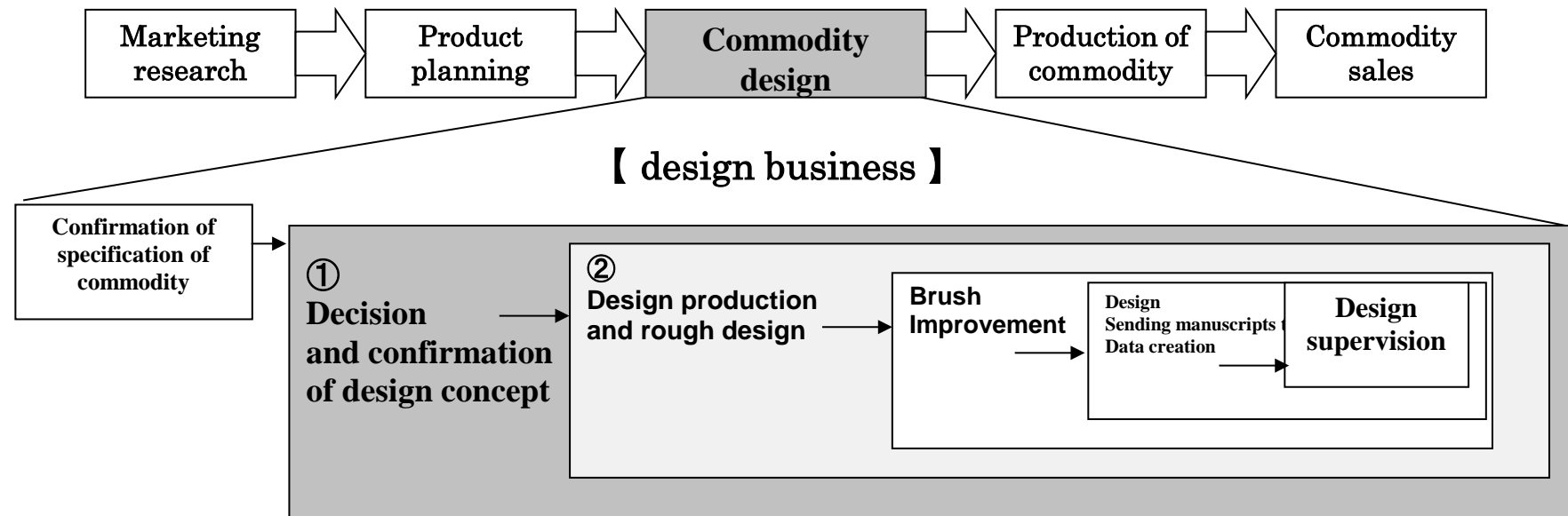
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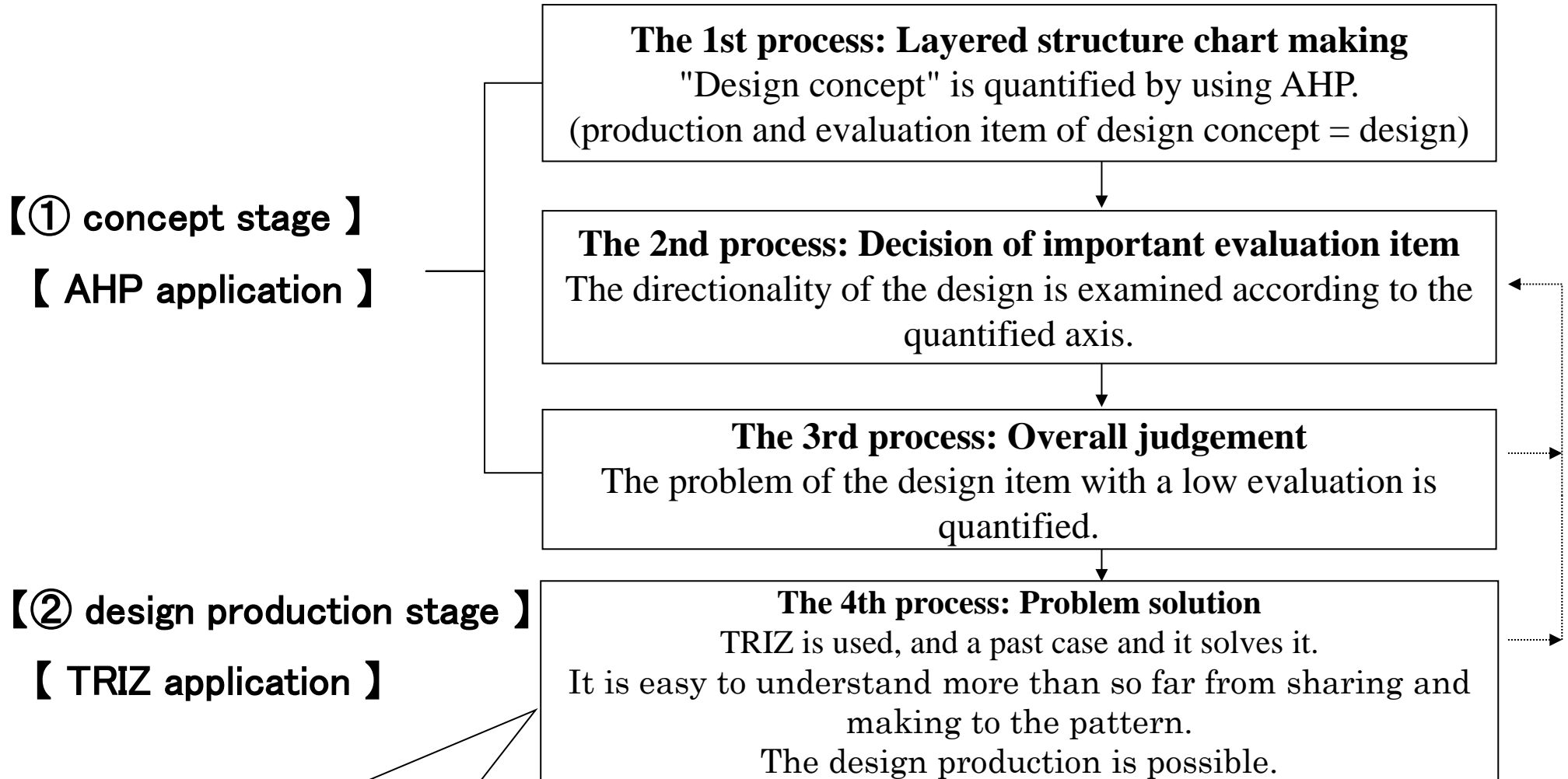
**This time
Topics of
research**

Approach of research

- Business arrangement and inventory by quantifying and seeing [eru] making about design business
- Proposal of the process model by whom engineered method is taken
- Plan comparison of effect verification of → sales performance and questionnaire evaluation of designer and developer



Approach of research



The mutually exclusive dichotomy problem occurs without fail.
Ex . Design element and area × volume of information
The number of color × specification (cost)
Every trend × receiving and its own rule

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

→② The problem is solved with TRIZ.

Development case: Long seller set commodity design renewal

【 procedure 】

【① concept stage 】

The 1st process: The sales budget has been achieved with the above-mentioned commodity in the past of ①. It is hearing in the old-timer designer (two people) as for the design evaluation item (concept).

The 1st process: ② The element that becomes the evaluation item of the design is clarified, and consolidated in nine.

The 2nd process: ③ Weight it by the old-timer about nine elements (priority level).

The 2nd process: ④ Design production of young man designer based on the above-mentioned

【② design production stage 】

The 2nd process: ⑤ The consensus building ..design idea.. is evaluated on among the developers.

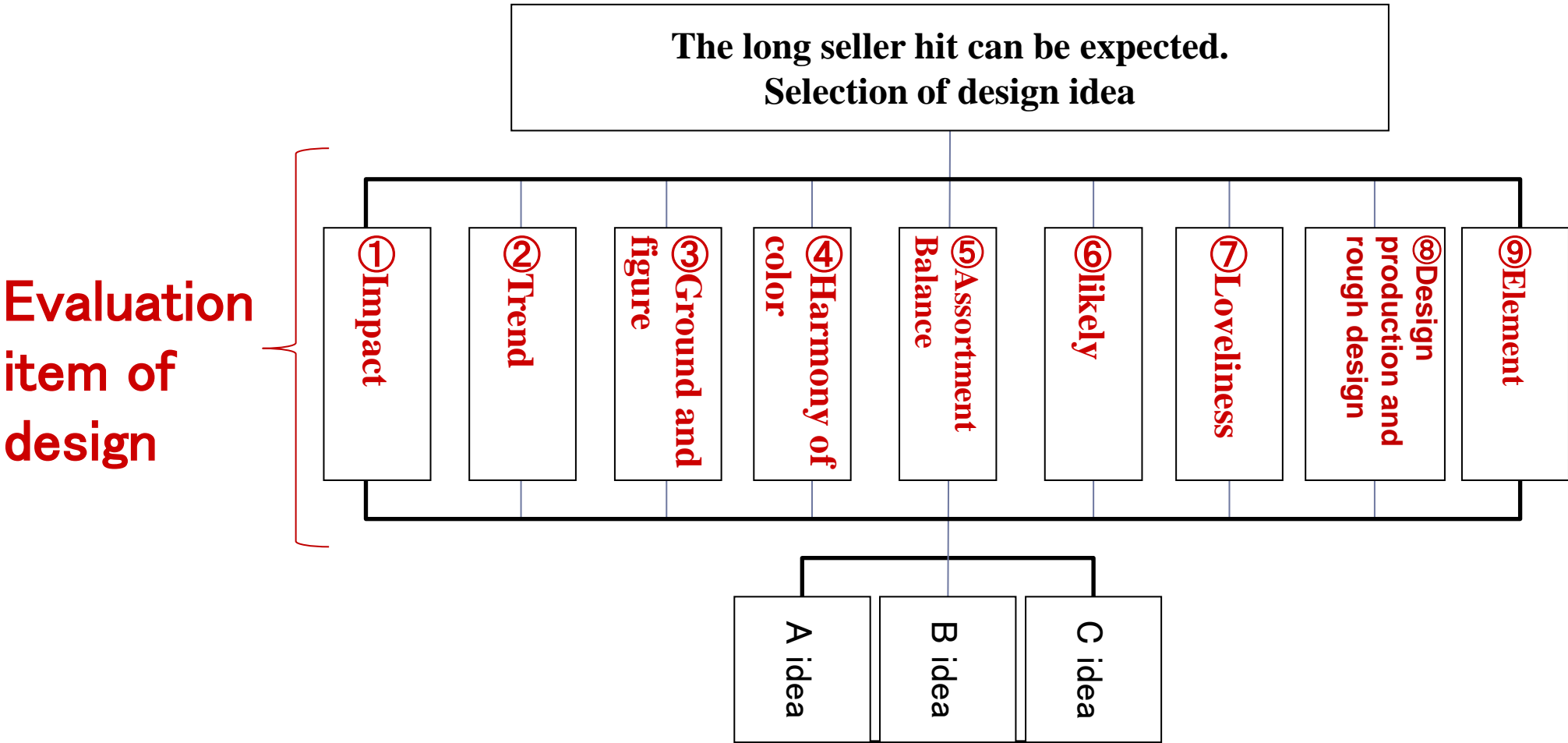
The 3rd process: ⑥ The item with a low evaluation and the occurring design problem are quantified, and the improvement item is decided.

The 3rd process: ⑦ The design problem with a low evaluation is solved and the improvement idea is produced.

→**Sending manuscripts to a printing office design completion**

【① concept stage】The 1st process

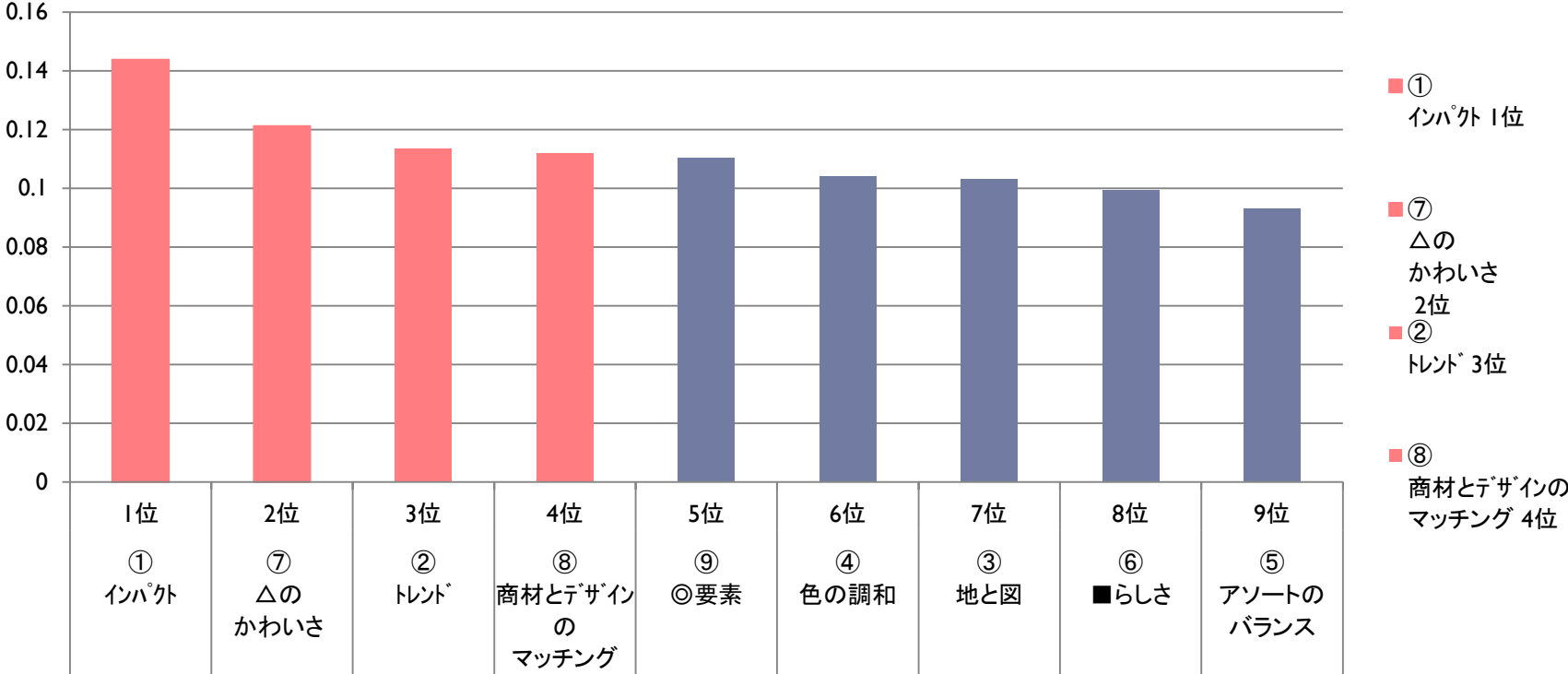
It is hearing in the old-timer designer (two people) who is achieving procedure ① → sales.
②③ The element that becomes the axis of → design is clarified and consolidating → is evaluated to nine.



【① concept stage】The 1st process

Weight of evaluation

item デザイン 評価項目	① インパクト	⑦ △の かわいさ	② トレンド*	⑧ 商材とデザイン の マッチング	⑨ ◎要素	④ 色の調和	③ 地と図	⑥ ■らしさ	⑤ アソートの バランス
評価項目の重要度	1位	2位	3位	4位	5位	6位	7位	8位	9位
ウェイト得点	0.1437576	0.1211637	0.1134312	0.112054985	0.11029244	0.10415055	0.102965831	0.099263386	0.092920328



→Importance and four high ranks of the design concept

①Match of ⑧ lovely and ② trends of impact and ⑦* and commerce material and designs

The design production is done according to [deari] and the axis.

【① concept stage】The 2nd process

Procedures ④-⑤ → It produces the design based on weight. → AHP evaluation

idea A



- The image is an image to the end.
It is different from an actual commodity.

idea B



idea C



- Three-kind single-unit commodity

【① concept stage】The 3rd process

The consensus building ..design idea.. is evaluated on among the developers procedure ⑤.

Evaluation of each design idea

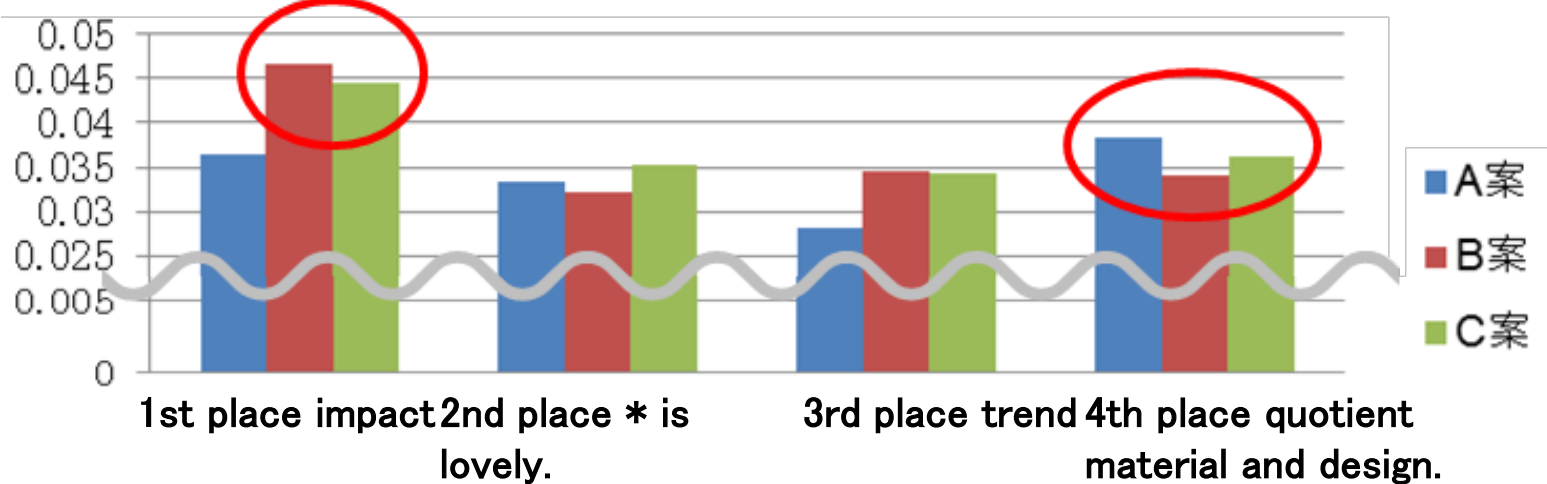
デザイン 評価項目	① インパクト	⑦ △の かわいさ	② トレンド	⑧ 商材とデザインの マッチング	⑨ ◎要素	④ 色の調和	③ 地と図	⑥ ■らしさ	⑤ アソートの バランス	
評価項目の重要度	1位	2位	3位	4位	5位	6位	7位	8位	9位	
ウェイト得点	0.1437576	0.1211637	0.1134312	0.112054985	0.11029244	0.10415055	0.102965831	0.099263386	0.09292	総合
A案	0.036466036	0.033220164	0.028109338	0.038329107	0.032758849	0.03062847	0.025207131	0.027697348	0.029836	0.282252
B案	0.046715618	0.032031415	0.03442998	0.034063866	0.035283378	0.02878579	0.029421571	0.023674347	0.030814	0.29522
C案	0.044515706	0.035136202	0.034229423	0.036108102	0.036562938	0.02725329	0.031144876	0.026720595	0.03106	0.302731
C案の評価	2位	1位	2位	2位	1位	3位	1位	2位	1位	1位

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

【① concept stage】The 3rd process

The consensus building ..design idea.. is evaluated on among the developers procedure ⑥.

A-C idea of important high rank 4 item each score



→C idea became in most items in nine concepts and the evaluations became high results most. However, when the evaluation (importance and four design concept high ranks) was seen, the evaluation of C idea became a low result by the item of the match of the 1st place impact, the 4th place quotient material, and the design.

Therefore, it can be said that it is a design item with room for improvement for this 1st place impact, the 4th place quotient material, and the item of the match of the design.

【② concept stage】The 3rd process → The 4th process

The consensus building ..design idea.. is evaluated on among the developers procedure ⑥.

The improvement rough is made based on C idea with the highest evaluation.

①Design problem that became clear [de]

It squeezes it to the improvement of 1st place "Impact".

→"Harmony of the color" occurs and deterioration and the contradiction problem occur.

(design problem that occurs in this area by this case and our design development)

②The problem is solved with TRIZ (design version contradiction matrix and invention principle).

(invention principle and contradiction matrix of TRIZ)

There is a constant law in 400,000 patent technologies and the same principle is used many times exceeding industry and the age.

→The quotient material, the component, and the design rule are effective also for the solution of the problem of a constant our commodity design.

【② design production stage】

The 4th process

Production of Procedure ⑦ improvement idea

【 design version TRIZ 】The parameter is consolidated in 11.

	デザイン分類		デザインパラメータ			ダレルマン2003版TRIZ
1	デザイン部分のかたち・面積・長さ	←	デザイン面の長さ デザイン面積 デザイン面のかたち	←	4	静止物体の長さ/角度
					6	静止物体の面積
					8	静止物体の体積
					9	形状
2	デザイン上の制約・有害要素		デザインの有害要素 悪い副作用		30	有害なもの放出
					31	システムが作り出すその他の有害な効果
3	強さ・魅力・インパクト		強さ・魅力・インパクト		15	力/トルク
					18	パワー
					20	強度
4	色彩		色彩		39	美しさ/見かけ
5	トレンド・斬新さ・新たな表現		トレンド・斬新さ・新たな表現		18	パワー
					39	美しさ/見かけ
6	作りやすさ 制作スケジュール		制作時間 制作の時間・スキル デザインの再現性		21	(物質の構成の)安定性
					26	時間の損失
					44	生産性
7	デザイン構成要素(量)		デザイン構成要素の量		10	物質の量
8	デザイン構成要素(質・テスト)		デザイン構成要素のテスト		25	物質の損失
9	デザイン精度(クオリティ)		デザイン精度・クオリティ		42	製造精度/一貫性
10	ストーリー・情報・ コンセプトのわかりやすさ		デザインの情報		28	情報の損失
11	◎オリジナル要素		◎らしさ ◎独自要素		32	適応性/汎用性
					35	信頼性/ロバスト性(頑健性)

【② design production stage】

The 4th process

Production of procedure ⑦ improvement idea

Design version TRIZ

【 contradiction matrix 】

		1	2	3	4	5	6	7	8	9	10	11
		か た ち ・ 面 積 ・ 長 さ	有 害 要 素 上 の 制 約 ・	印 象 の 強 さ ・ パ ク ト ・	色 彩	新 し な 表 現 ・ ト レ ン ド ・	制 作 の 手 間 ・ ス ケ ジ ュ ー ル	(量 ・ イ ン 構 成 要 素	(質 ・ イ ン テ ン シ テ イ ス ト 要 素	(ク オ リ テ イ 度 ・	わ か り や す さ の ・	オ リ ジ ナ ル 要 素
1	デザイン部分のかたち・面積・長さ		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	17 19 35 12 3 32 7 14 26 22 5 13 19 28 6 30 2 4 1	35 3 15 17 14 5 30 28 1 19 7 37 24 10 4 40 18 6 2 13 26	4 3 25 17 35 26 1 40 30	28 24 35 12 17 14 10 39 40 30 3 5	30 32 10 3 2 35 25 40 22	28 24 13 3 2 16 7 17 32 14	1 19 35 15 4 28 6 2 17 40 5 25 3 10
2	デザイン上の制約・有害要素	17 14 4 13 24 3 15 35 17 40 1 5 30 7		10 3 15 35 28 4 18 40 17 5	17 7 10 5 2 28 24	35 28 10 3 4 17 7 5 2 24	15 4 19 3 1 2 10 35 13 25 40 14 9 23 5 14 28	35 10 19 1 3 24 39	10 12 14 34 35 24 15 2 15 25 17 26 4	2 15 25 17 26 4 10	10 16 13 2 4 7 10 32	19 35 10 13 2 40 3 4 1 15 14 24 4
3	インパクト・魅力・印象の強さ	35 28 17 9 1 3 40 10 14 4 19 13 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	19 35 37 17 14 3 7 12 28 15 22 40 4 10	35 10 24 21 10 3 23 37 17 19 28 31 1 15 6 14 40 13 5 4	14 18 29 28 35 19 38 4 3 30 17 31 9	3 35 40 12 30 1 28 29 31 24	28 29 5 37 2 3 10 14 32 6 23	37 32 7 24 1 10 19 28 37 32 26	15 17 3 19 14 35 1 13 28 2 24 40 4 5
4	色彩	17 14 15 3 1 4 28 32 7 2	4 28 15 35 2 13	3 28 7 4 15 14 32 9 17 40 2		15 4 14 32	3 40 10 35 7 10 6 2 9 12 28 15 1	30 40 3	28 17 3 4 1 3 22 10 24	3 7 32 10 4 4	28 7 15 2 35 3 4	
5	トレンド・斬新さ・新たな表現	17 14 1 35 4 19 13 25 36 15 3 28 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		35 1 5 10 15 6 28 19 14 3 40 7 2 9 12	35 19 4 3 30 40	30 1 28 17 3 4	2 3 10 14 32 22 24	10 19 24 28 3 7 32 4	15 28 19 35 2 3 24 7 4
6	制作の手間・制作スケジュール	17 4 35 3 39 40 24 1 7 5 14 10 12 28 19 2 13	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	35 24 17 4 3 22 6 10 1 28 2 13		5 24 40 35 10 3 2 25 9	40 2 14 3 7 24 10 35 18 35 12 34	3 25 2 12 5 26 24 32	24 10 32 7 28 2 3 25	40 35 15 30 24 28 13 3 14 4 10 1
7	デザイン構成要素(量)	35 3 17 4 2 25 7 14	1 35 24 40 3 12	35 14 40 3 19 14 17 9	30 17 28 14	35 19 3 30 17 28 14	35 24 9 40 3 25 19 1 15 17 13 36		24 4 10 34	30 3 33 25	15 28 35 24	1 15 17 40 3 35 16
8	デザイン構成要素(質・テイスト)	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	28 25 13 17 4	1 30 19 24 35 15 2 28 5 25 24	24 3 10 6		24 10 3	32 40 1 10 3	2 15 28 10 12 35 34
9	デザイン精度(クオリティ)	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 32 16 3 17 7	24 35 33 28 15 5 7 13 1 4 2 10 39	30 25 32 9	10 35 24		13 10 2 34 7	35 7 13 1 4 28 25 5
10	ストーリー・コンセプトのわかりやすさ	28 25 17 26 16 25 32 1 14 24 3 4	7 1 13 35 10	13 17 24 10 19 25 35 3	32 3 17 7 5	10 19 24 25 32 3 17 7 5	35 30 10 26 25 22 24 5 9 13	17 28 24 7	7 17 2 3 13	25 17 1		24 5 25 9 13 10 26
11	◎オリジナル要素	17 4 26 28 6 24 15 3 16 15 2 30 24 35 7 35 3 14 4 5 40	1 19 10 24 25 4 30 3 13 2 26 35 40	35 15 17 14 19 1 24 40 3 8 28 4 1 10 12	28 2 32 3 14	19 1 24 35 28 2 32 3 4 10 40 14	35 40 4 14 28 15 1 15 25 2 3 39 10 5 13 12	30 35 3 28 40	13 10 3 15 35 12	40 35 16 1 3 13 10 4	7 3 10 26 25 28 32	

Reference :
Problem settlement plan of similar
item to "Harmony of color" and
"Impact"

【② design production stage】

The 4th process

Production of procedure ⑦ improvement idea

Design version TRIZ

【 contradiction matrix 】

【 design version invention principle 】

→14, 3, 7, 12, 28, 15, 22, 17,

Correspondence

Based on the prototype of TRIZ

- ・General design theory
- ・Design law
- ・Visual effects
- ・Man's intention and psychology action
- ・Our design rule

The parameter of TRIZ is belonging made for the design the application by the ratio idea.

(The reference literature has been described to the last slide.)

デザイン版発明原理
原理
1. 分割
2. 分離・抽出
3. 局部的性質
4. 対称性
5. 併合
6. 汎用性
7. 入れ子構造
8. カウンタウェイト
9. 先取り反作用
10. 先取り作用
11. 事前保護
12. 等ポテンシャル
13. 逆発想
14. 曲面
15. ダイナミック化
16. 部分的解決または過剰解決
17. もう一つの次元
18. 有効性の連続性
19. 害を益に変換
20. フィードバック
21. 仲介
22. セルフサービス
23. 模倣品をコピー
24. 柔軟な殻と薄膜の利用
25. 色を変える
26. 均質性
27. 部分の放棄・変形または再生成
28. 要素の状態・位置の変移
29. 不活性な環境
30. 複合材料

Future tasks

▶ Desirable Result

Proposal and result of process model at level that can be operated by business

▶ Future Tasks

①AHP

It was possible to say much for accuracy or more by matching the vector by using "Consensus building method →FD method of weight" of each evaluator of the design concept. However, being not able to solve vagueness by the individual variation of the previous work etc. becomes future tasks.

②TRIZ

It is not so, divides from suitable "Commodity design & design problem", and the point where the ascertainment is necessary becomes future tasks though TRIZ is applied at an actual commodity design production stage and the effect is verified.

Reference literature

- Illustration TRIZ Ikuo Yamada
- Design and Sensibility Katsuo Inoue
- Basic of mathematical principle sensibility engineering Shinya Nagasawa
- Introduction of operations research for problem solving Eizou Takai
- Game sense decision making method
- Design Rules Index William Lindwell

- Analysis of "The consumer's preference and dislike" concerning shampoo bottle as package design
(2006 Kyou Toyoguchi)
- Concept of commodity concept Tomihiro Katayama
- Essence of target costing and product development Koji Yamamoto