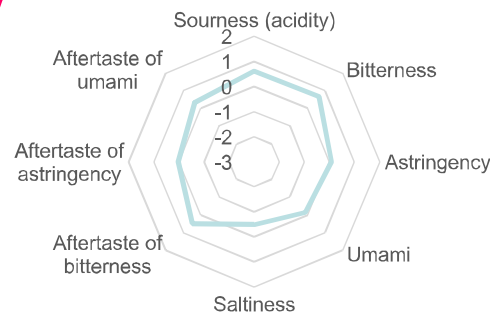


Blending Coffee with Optimization Software

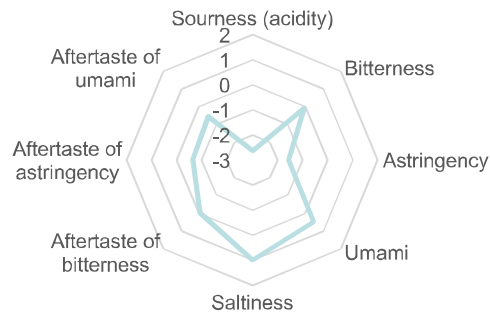
Targeting Blue Mountain coffee

	Acidity	Bitterness	Astringency	Umami	Saltiness	Aftertaste of bitterness	Aftertaste of astringency	Aftertaste of umami	L value	Bled ratio (%)	
Blue Mountain No.1 (L:20)	0	0	0	0	0	0	0	0			
Colombia (EXC) (L:18.5)	0.61	0.68	0.08	-0.11	-0.49	0.49	0.02	0.35	Colombia	18.5	49.9
Brazil No.2 (L:18.5)	-2.65	-0.07	-1.57	0.47	0.99	-0.04	-0.63	-0.55	Brazil	18.5	20.3
Brazil No.2 (L:20)	-0.61	-0.7	-0.63	0.1	-0.14	-0.53	-0.29	0.11	Brazil	20	7.4
Brazil No.2 (L:21)	1.3	-1.19	0.16	-0.19	-0.92	-0.48	0.17	-0.62	Brazil	21	22.5
Blended	0.18	0.13	-0.09	-0.06	-0.74	-0.11	-0.14	0.12			

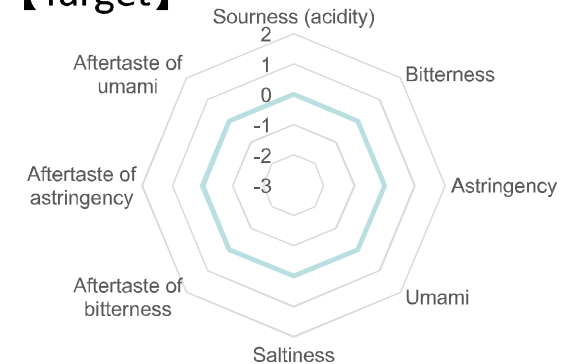
Colombia (EXC) (L:18.5)



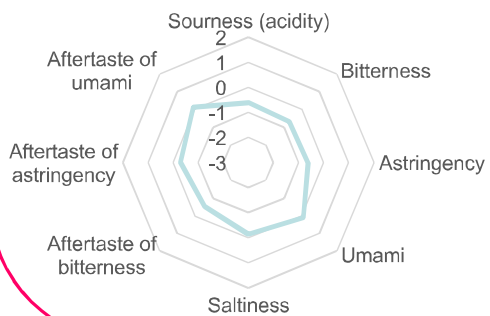
Brazil No.2 (L:18.5)



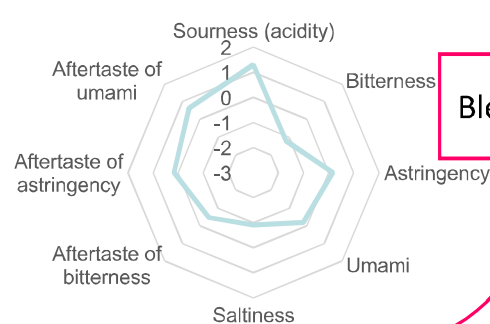
【Target】



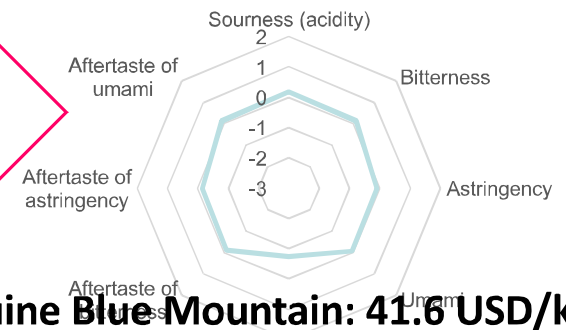
Brazil No.2 (L:20)



Brazil No.2 (L:21)



【Final result】



Blended

Genuine Blue Mountain: 41.6 USD/kg
Calculated Blue Mountain: 4 USD/kg

Coffee Application

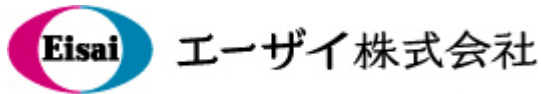
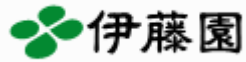


Intelligent Sensor Technology, Inc.

Taste qualities available from the Taste sensor

Taste information		Taste substances	Sample
Initial taste (relative value)	Sourness	Tastes derived from organic acids such as citric, tartaric and acetic acids.	Beer, coffee
	Saltiness	Tastes derived from mineral salts such as NaCl and KCl	Soy source, soup, noodle soup
	Bitterness	Bitterness can be hidden flavors or richness at lower concentration	Soup, bean curd, sake
	Astringency	Astringent substances provide richness or secret ingredient at lower concentration	Fruit
	Umami	Taste of soup stock derived from amino acids and nucleic acids	Soup, noodle soup, meat
	Sweetness	Taste derived from sugars and sugar alcohols	
Aftertaste (CPA value)	Bitterness aftertaste	Lasting bitter taste contained in foods and beverages	Beer, coffee
	Astringency aftertaste	Lasting astringent taste produced by catechins and tannins	Wine, tea
	Richness (umami aftertaste)	Lasting umami taste	Soup, noodle soup, meat

Customers



More than 350 systems in the world.

Sensory test is difficult

Market Research:

“We tried sensory evaluations, comparing to a competitor’s products, but it was impossible to grasp market trends because there were too many samples.”

“Sensory evaluation puts a burden on panelists.”

“Results sometimes differ among panelists.”

New Product Development:

“It is difficult to communicate the actual taste of products, because there is no objective measurement of taste.”

Product Marketing:

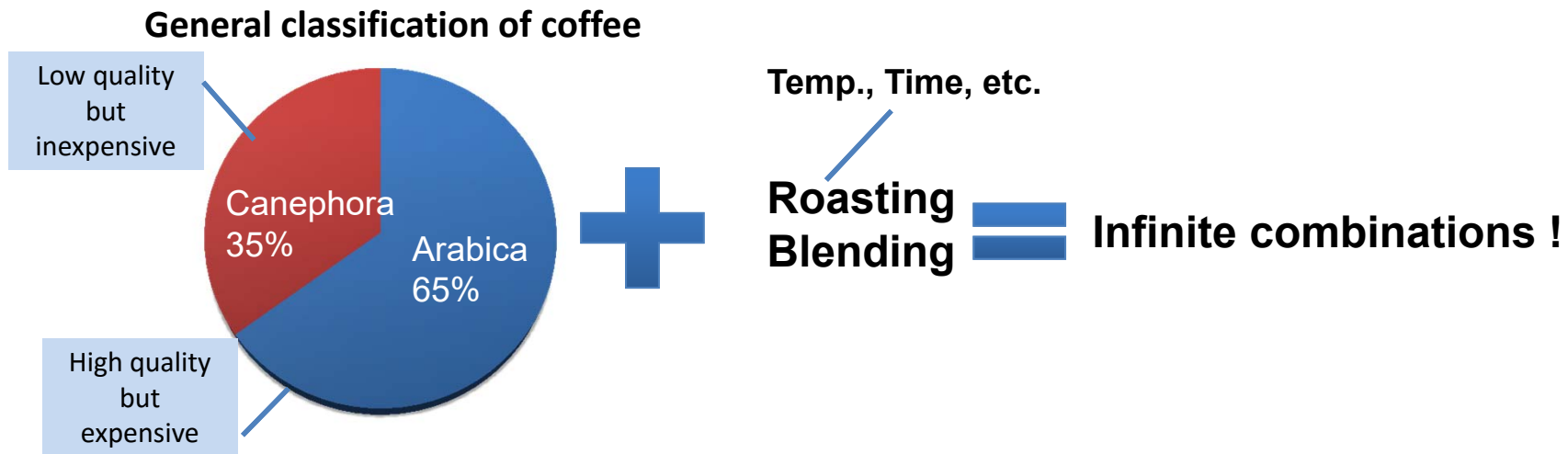
“We have no confidence in whether the final prototype corresponds with development concept.”

“It takes a lot of time and expense to provide market research for a new product.”

Quality Control:

“it is difficult to check the quality of many samples quickly and easily.”

**An objective taste measurement
is strongly required.**



“It takes long time to become a coffee blender, because learning is accomplished through hands on training, and experience.”

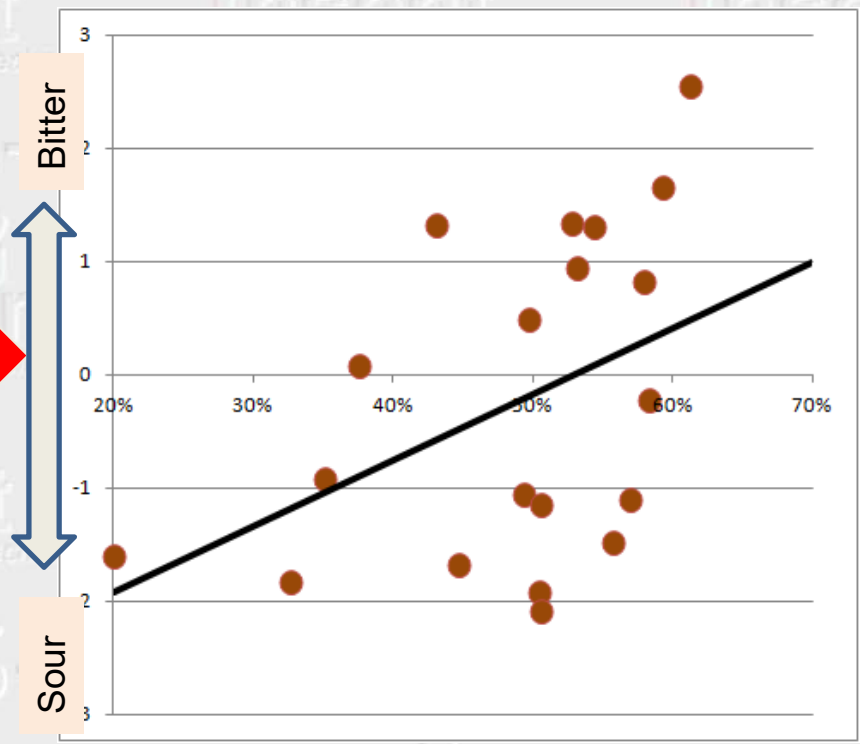
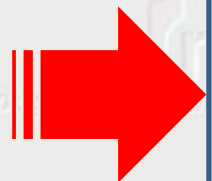
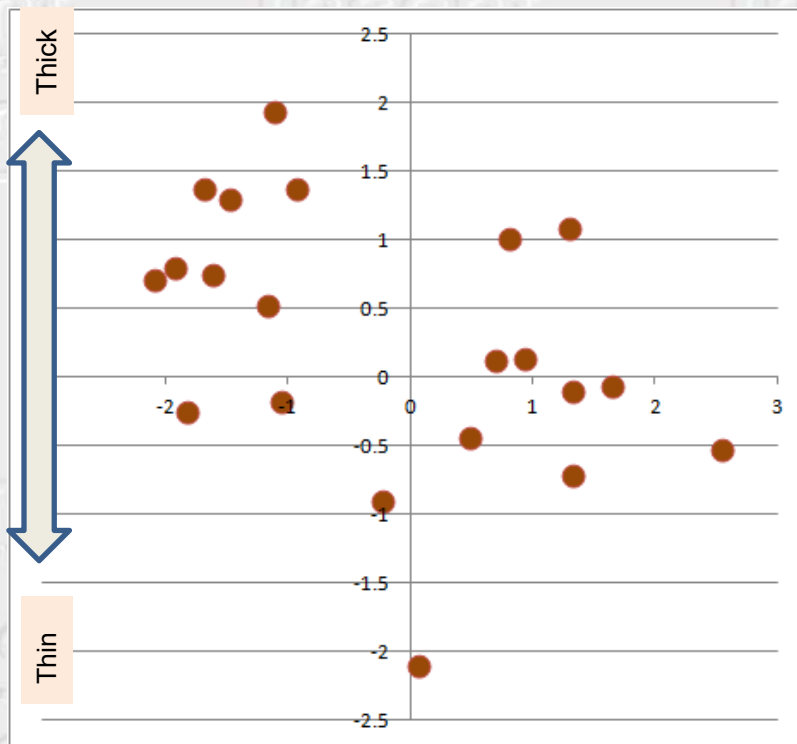
By using the Taste Sensing System,

- Accumulated sensor outputs can provide *objective* information on their customers and consumers.
- Product design development time is greatly shortened, because the optimization of taste and the associated costs, cannot be achieved by a trained blender alone.

K. Toko ed., *Science and Technology to Produce Deliciousness of Foods/Medicines and Ensure The Safety*, CMC Publishing (2012) (in Japanese).

POS(point of sales system) data with Taste data

Regular coffee POS data
20, 30, 40 yrs buyer taste preference



Sour ← → Bitter

Over 40 ← → Less than 40

Data provided by Taste Aroma laboratory inc.

Optimization calculation of coffee beans based on taste with market price

Coffee bean importer, Ishimitsu co, Ltd

- Cost down more than 10%
- Reduction of stock more than 50%

Data base of taste data of beans by TSS

(1) Price + Taste data

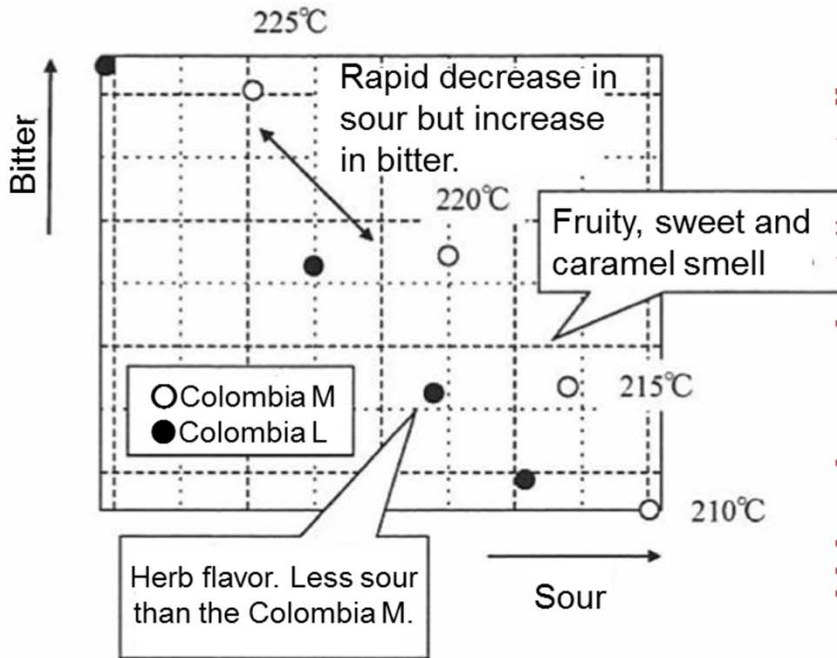
(2) Copy taste of target product

(3) Calculate blend ratio for target product at minimum cost



『Food・Drug Technology to secure Taste and Safety』
Chapter 26 「Development of Coffee product
By use of Taste sensing system」
Author Ishimitcu Co., Ltd Mr. Ishiwaki

Example: visualize of product's qualities

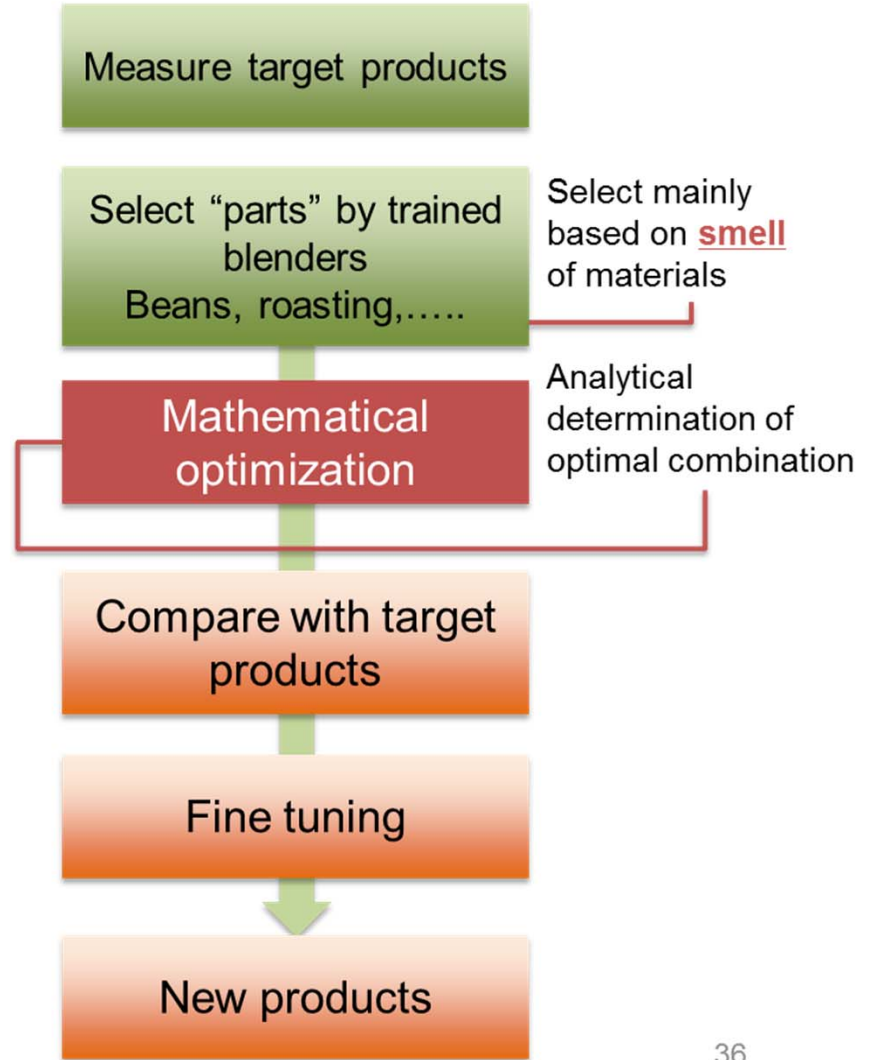


Accumulate tastes and smells data for roasting processes.

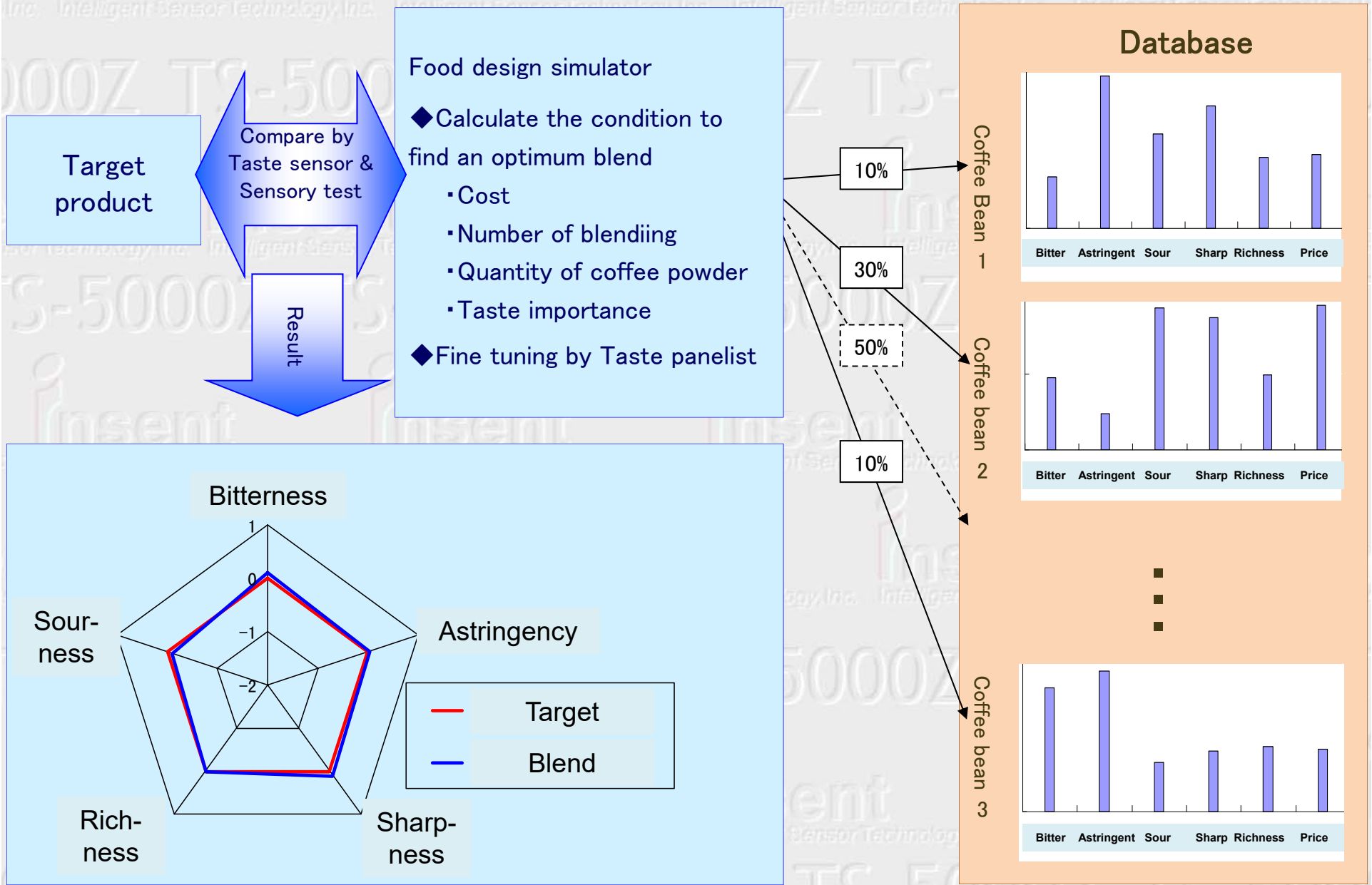
K. Toko ed., *Science and Technology to Produce Deliciousness of Foods/Medicines and Ensure The Safety*, CMC Publishing (2012) (in Japanese).

Current procedure
Case: **Regular coffee**

Trained blenders select "parts"

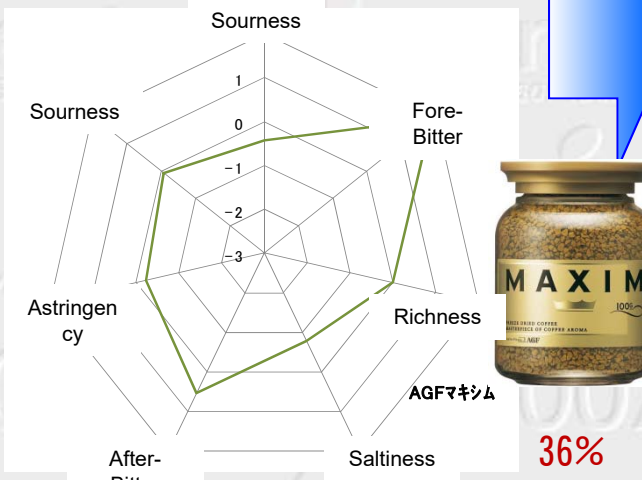
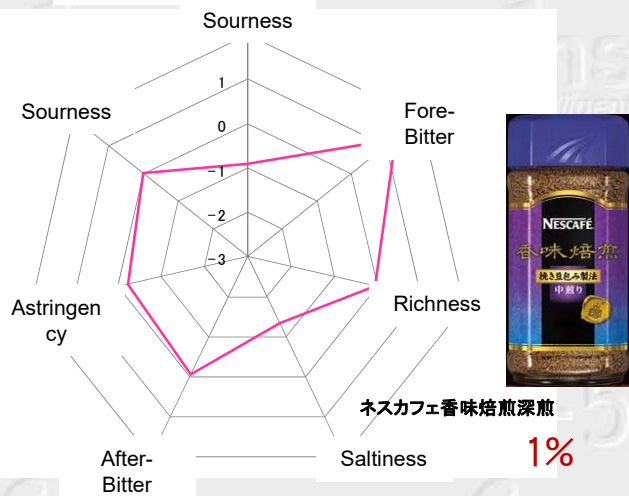
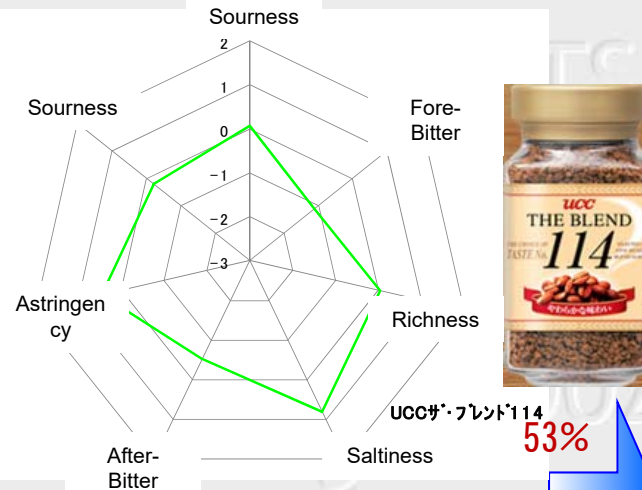
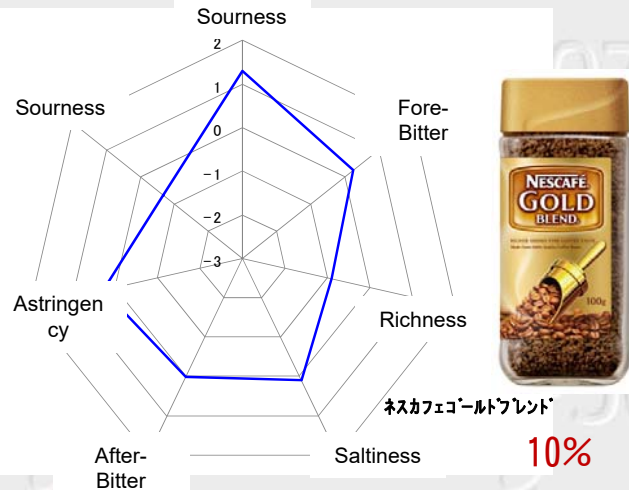


Example of Coffee product design

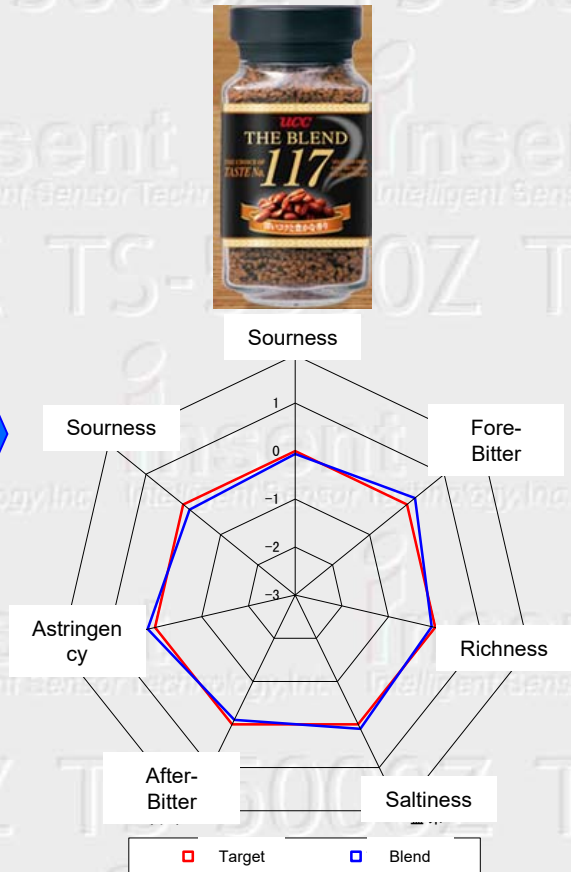


Example

Evaluate Target product first and calculate the blending ratio



TARGET



◆ How to make coffee sample



Weight 7 gram



Pour 130g hot water



Stir gently



Filter

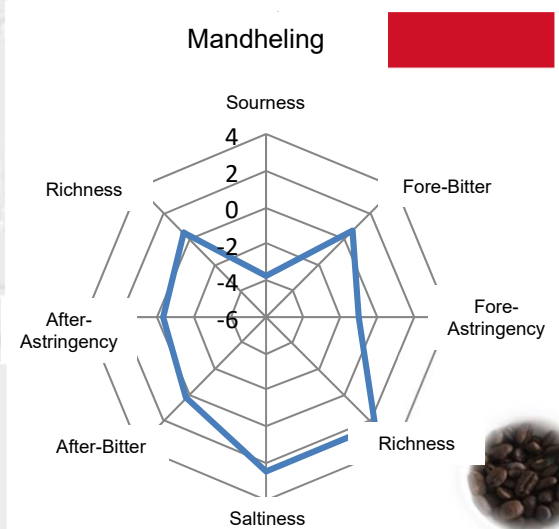
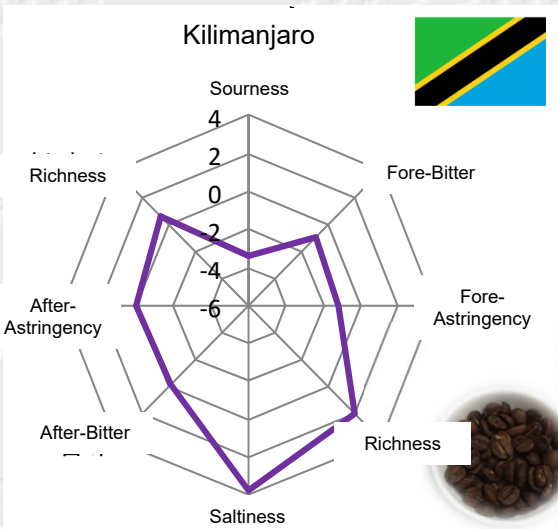
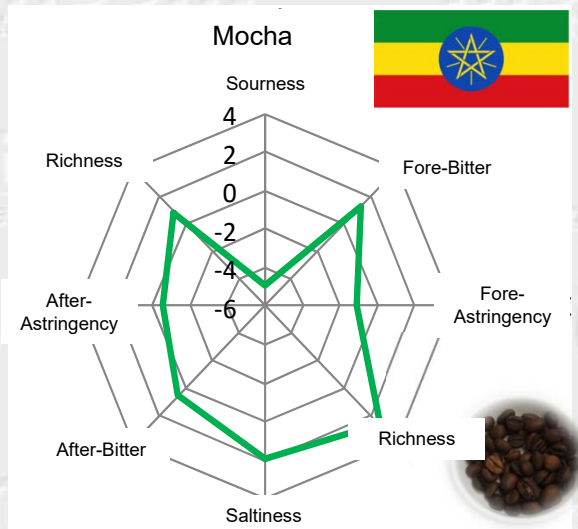
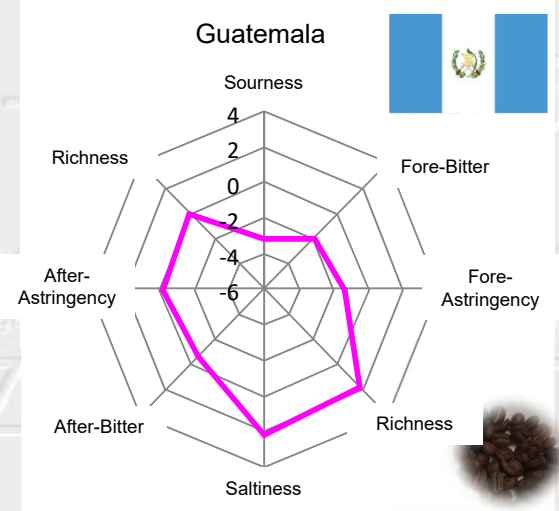


1. Milling coffee bean
2. Take 7g sample
3. Put 130g hot water, keep 10sec
4. Stir slowly 5 times
5. Keep 4 min
6. Filtering
7. Cool sample to ambient temp

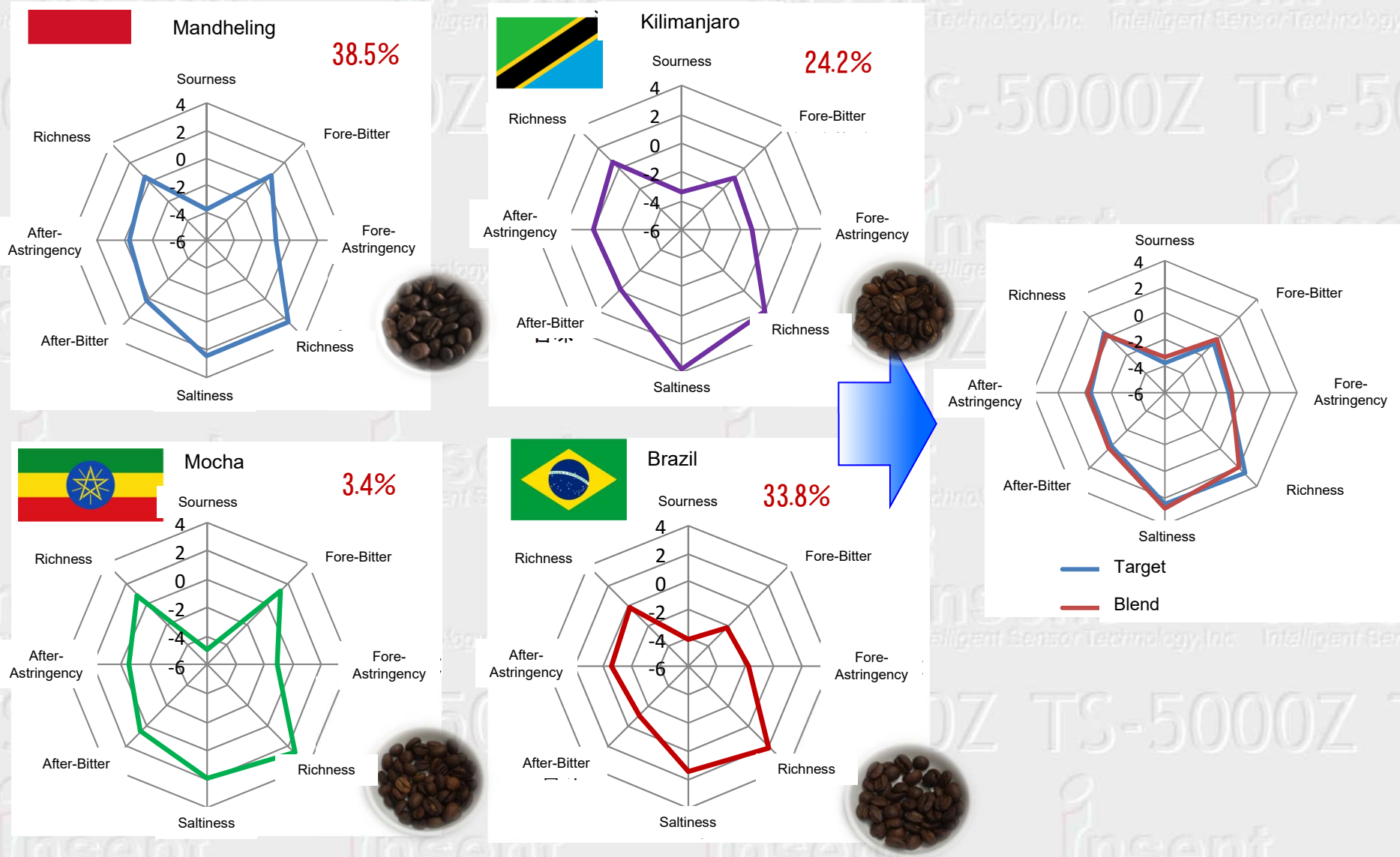


Cooling

Taste feature from countries

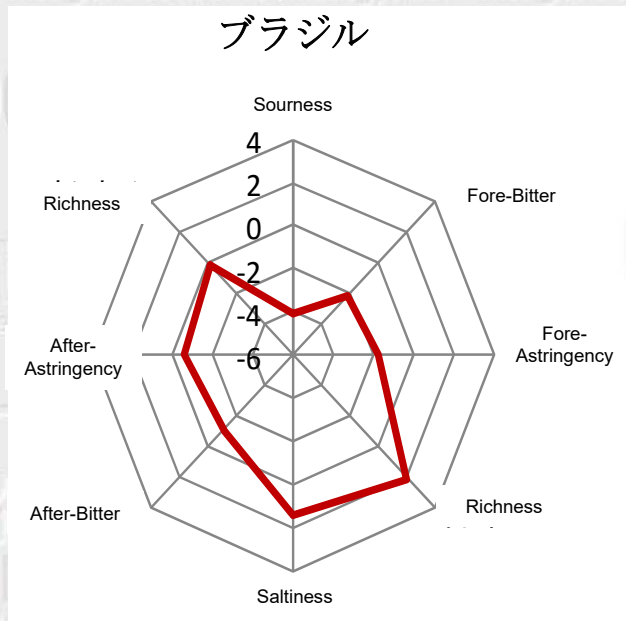


Example: Optimum calculation for Target taste



Confirm the taste of blended and target sample are same by taste panelist

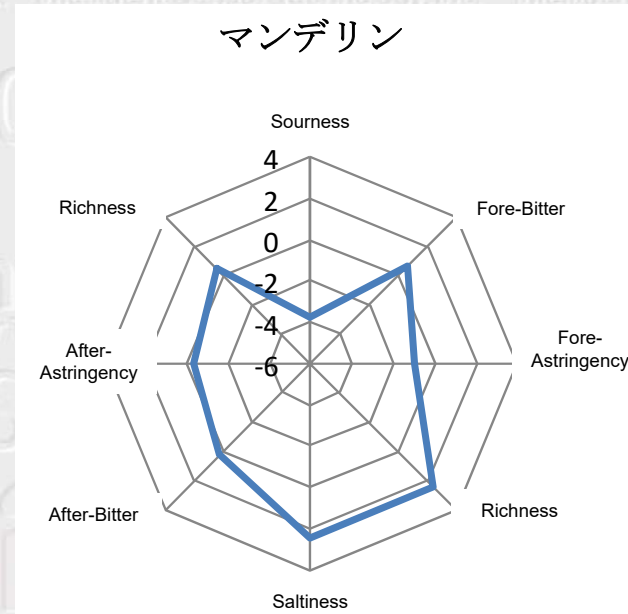
Comparison between evaluated data and calculation data



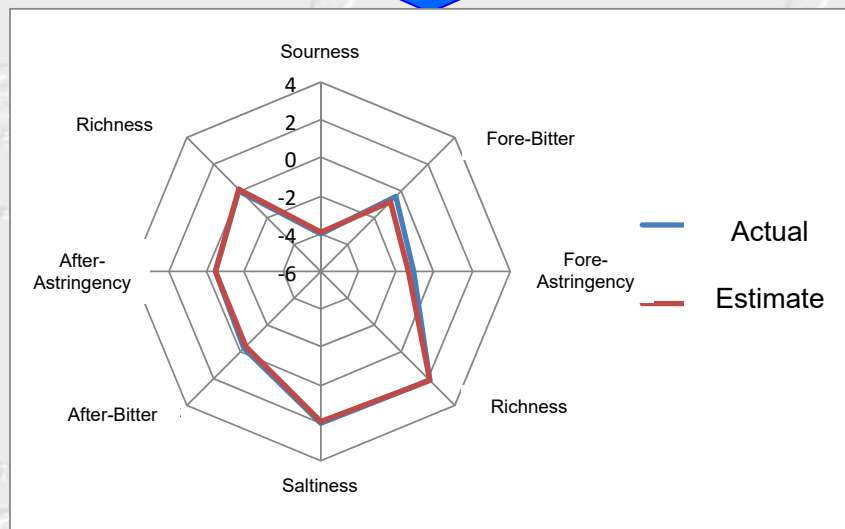
50%



Calculate



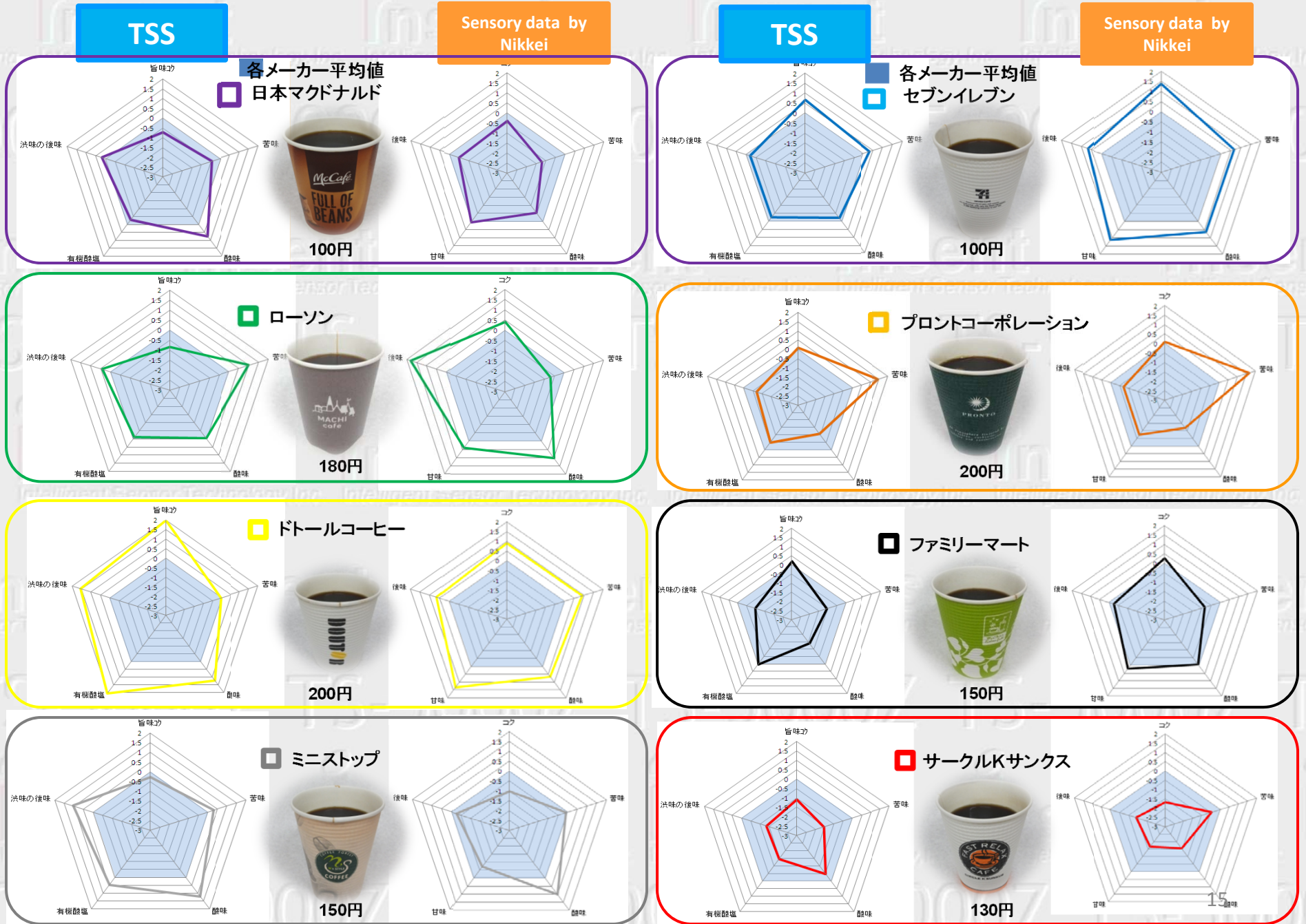
50%



Calculated value and actual measurement data are overlapped.



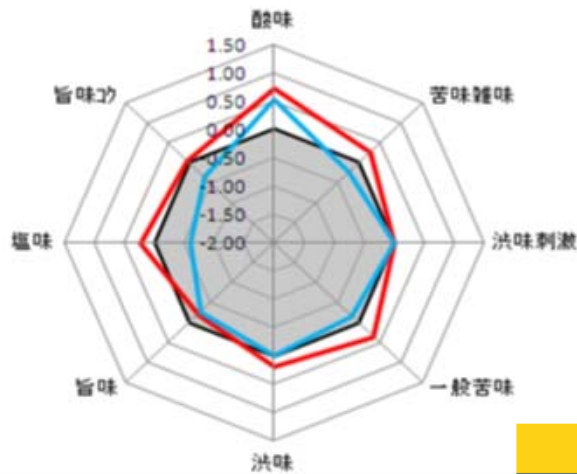
Comparison between TSS and sensory data (Left is TSS, Right is Nikkei MJ(2013/3/4))



Taste difference of Bean grade (Columbia and Brazil bean)

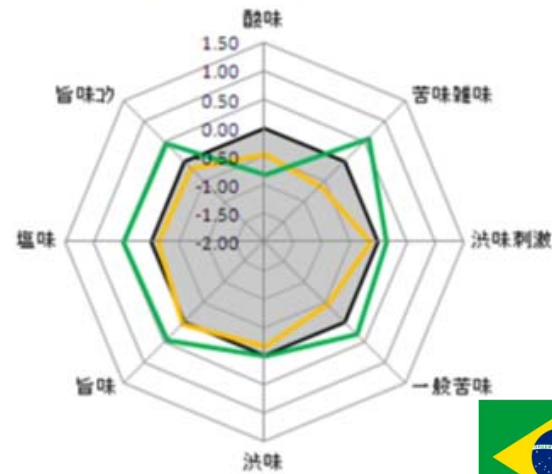
Taste difference Ave. vs Columbia

■ Ave
 ■ Excelso
 ■ Suplemo



Taste difference Ave. vs Brazil

■ Ave
 ■ #2
 ■ #4/5



— 人気のモカブレンドがグランドローストでも復活しました！ —
『香りふくらむモカブレンド』発売

良質なコーヒー豆をじっくりとロースト。酸味を抑えた味わいに仕上げた「グランドロースト」シリーズに、待望のモカブレンドが復活！モカの甘い香りを存分に引き出したやわらかな味わいが特徴です。

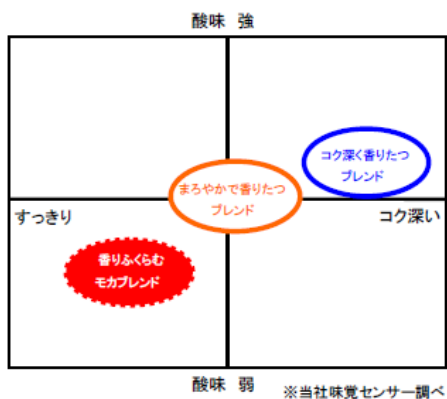
【商品概要】



商品名	グランドロースト 香りふくらむモカブレンド
商品の特徴	モカの甘い香りを存分に引き出し、やわらかな味わいに仕上げました。
規格	450g(粉)
賞味期間	12ヵ月
発売日	2011年3月1日
希望小売価格	オープン(参考店頭価格 698円税込)

※商品画像はこちらからご覧いただけます。

http://www.keycoffee.co.jp/photo/2011_ss/mocha.jpg



好評発売中

グランドローストシリーズ

良質なコーヒー豆をじっくりとロースト。酸味を抑えた味わいに仕上げ、日々の生活にほっとするひとときを提供するシリーズです。



コク深く香りたつブレンド 450g(粉)



まるやかで香りたつブレンド 450g(粉)



アイスコーヒー 360g(粉)

Summary

① Copy target taste

Blending ratio by Optimum calculation

② Blending study

Foresee taste by changing ratio of blends

③ Easy understanding of new product taste for buyers

④ Propose space management by taste

⑤ R&D by collaborating with POS data

Mathematical Optimization

✓ At first, installation of Excel® add-in Solver is required.

Step 1

- Select a target product and measure it using the Taste Sensing System
- Enter the results into the Excel sheet

Step 2

- Measure raw materials for product design using the Taste Sensing System
- Enter the results into the Excel sheet

Step 3

- Calculate the Mathematical Optimization

Step 4

- Blend raw materials based on the result and perform fine-tuning by a human sensory test if needed.

Step1

- Measure a target product using the Taste Sensing System.
- Enter the result into the Excel sheet.

The screenshot shows an Excel spreadsheet with the following data structure:

No.	Max	Min	S.D.	Ave.	Index	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10	
1	12.92	9.61	5.75	5.02	Bitterness	11.29	11.68	9.94	12.30	12.21	12.92	10.23	10.2	9.61	5.3	
2	17.85	15.49	8.61	7.58	Sourness	15.49	15.89	16.73	17.71	17.85	17.23	16.81	17.02	16.92	1.9	
3	9.93	9.28	4.87	4.29	Astringency	9.33	9.93	9.39	9.46	9.91	9.28	9.45	9.41	9.73	2.3	
4	5.15	3.90	2.31	2.02	Aftertaste-B	4.63	4.68	4.09	4.54	5.01	5.15	4.2	4.18	3.9	5.4	
5	7.61	4.03	3.31	2.83	Saltiness	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6	
6	7.61	4.03	3.31	2.83	A	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6	
7	7.61	4.03	3.31	2.83	B	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6	
8	7.61	4.03	3.31	2.83	C	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6	
9	7.61	4.03	3.31	2.83	D	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6	
10	4.98	3.28	2.22	1.93	Cost	4.88	3.99	4.42	4.79	4.60	4.60	4.60	3.28	3.29	0.5	
11	14.09	1.41	4.90	3.15	Others	14.1	7.5	2.9	2.4	3.8	13.1	13.4	1.4	4.3	6.1	
					min %	0.08%										
					Refofmin ratio	5.00%										
					selected Sample	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
					# of samples	5										
					Min ratio	0.00%										
					Max ratio	100%										
					$\alpha 1$	$\alpha 2$	$\alpha 3$	$\alpha 4$	$\alpha 5$	$\alpha 6$	$\alpha 7$	$\alpha 8$	$\alpha 9$	$\alpha 1$		
Weight	Residual	Estimate	Residual sum of squares*weight	1.0	Target taste	0.05813	0.022	0.555	0	0	0.365	0	8E-04	0	0.30	
1	0.10	11.14	0.01	Bitterness	11.04	0.66	0.25	5.51	0.00	0.00	4.71	0.00	0.01	0.00	0.00	
1	0.02	16.82	0.00	Sourness	16.80	0.90	0.34	9.28	0.00	0.00	6.29	0.00	0.01	0.00	0.00	
1	0.50	9.36	0.25	Astringency	8.86	0.54	0.22	5.21	0.00	0.00	3.39	0.00	0.01	0.00	0.00	
1	0.09	4.52	0.01	Aftertaste-B	4.61	0.27	0.10	2.27	0.00	0.00	1.88	0.00	0.00	0.00	0.00	
1	0.12	6.25	0.01	Sourness	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00	
0	0.12	6.25	0.00	A	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00	
0	0.12	6.25	0.00	B	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00	
0	0.12	6.25	0.00	C	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00	
0	0.12	6.25	0.00	D	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00	
1	0.09	4.51	0.01	Cost	4.42	0.29	0.09	2.45	0.00	0.00	1.68	0.00	0.00	0.00	0.00	
0	7.41	7.41	0.00	Others	0.00	0.82	0.16	1.63	0.00	0.00	4.79	0.00	0.00	0.00	0.00	
					Ave.	0.09										
					Variance	0.02										
						5.19										
						32.45										

Enter the measurement result (estimated taste values) here.

Step 2

- Measure raw materials for product design.
- Enter the results into the Excel sheet.

MO.xls [Compatibility Mode] - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Solver Foundation Acrobat Team

Get External Data Refresh All Connections Properties Edit Links Sort Filter Clear Reapply Advanced Text Col

Connections Sort & Filter Data Tools Outline Analysis

K36

Enter the results (estimated taste values) here

	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	S.D.	Ave.	Index	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10	Sample 11	Sample 12	Sample 13	Sample 14
2	5.75	5.02	Bitterness	1.29	11.68	9.94	12.30	12.21	12.92	10.23	10.2	9.61	5.3	5.2	6.8	2.6	2.8
3	8.61	7.58	Sourness	5.49	15.89	16.73	17.71	17.85	17.23	16.81	17.02	16.92	1.9	6.1	5.7	5.8	0.8
4	4.87	4.29	Astringency	9.33	9.93	9.39	9.46	9.91	9.28	9.45	9.41	9.73	2.3	7.3	1.5	6.8	0.4
5	2.31	2.02	Aftertaste-B	4.63	4.68	4.09	4.54	5.01	5.15	4.2	4.18	3.9	5.4	3.0	3.5	9.2	6.7
6	3.31	2.83	Saltiness	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6	6.5	6.6	0.9	7.7
7	3.31	2.83	A	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6	6.5	6.6	0.9	7.7
8	3.31	2.83	B	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6	6.5	6.6	0.9	7.7
9	3.31	2.83	C	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6	6.5	6.6	0.9	7.7
10	3.31	2.83	D	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6	6.5	6.6	0.9	7.7
11	2.22	1.93	Cost	4.98	3.99	4.42	4.79	4.60	4.60	4.60	3.28	3.29	0.5	4.8	5.8	5.1	1.1
12	4.90	3.15	Others	14.1	7.5	2.9	2.4	3.8	13.1	13.4	1.4	4.3	6.1	9.2	13.0	2.7	2.8
13																	
14	min %	0.08%															
15	Ref of min ratio	5.00%	selected Sample	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0
16	Min ratio	0.00%		5.8%	2.2%	55.5%	0.0%	0.0%	36.5%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	Max ratio	100%		$\alpha 1$	$\alpha 2$	$\alpha 3$	$\alpha 4$	$\alpha 5$	$\alpha 6$	$\alpha 7$	$\alpha 8$	$\alpha 9$	$\alpha 10$	$\alpha 11$	$\alpha 12$	$\alpha 13$	$\alpha 14$
18	Residual sum of squares*weight	1.0	Target taste	0.05813	0.022	0.555	0	0	0.365	0	8E-04	0	0.3029	0.0092	0	0.0006	0
19	0.01	Bitterness	11.04	0.66	0.25	5.51	0.00	0.00	4.71	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	Sourness	16.80	0.90	0.34	9.28	0.00	0.00	6.29	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
21	0.25	Astringency	8.86	0.54	0.22	5.21	0.00	0.00	3.39	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
22	0.01	Aftertaste-B	4.61	0.27	0.10	2.27	0.00	0.00	1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.01	Sourness	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	A	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	B	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	C	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	D	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
28	0.01	Cost	4.42	0.29	0.09	2.45	0.00	0.00	1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	Others	0.00	0.82	0.16	1.63	0.00	0.00	4.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

VerEng

Ready

75%

Step 3-1

- Calculate the Mathematical Optimization: setting options

Select the samples to be used for the optimization. If enter "1," the sample is to be used and "0" not to be used in the optimization.

Enter the minimum percentage of raw materials to be used in blending if needed. For example, if 3% is entered in the cell (E16), the raw materials contributed less than 3% will be automatically omitted from the result. As a result, the numbers of required raw materials for the final result will be decreases as shown in the cell (C16).

Step 3-2

- Calculate the Mathematical Optimization

1. Click the Data tab
2. Click Solver
3. Click Solve

The screenshot shows the Microsoft Excel interface with the Solver Parameters dialog box open. The 'Data' tab is selected in the ribbon, and the 'Solver' button is highlighted. The Solver Parameters dialog box is open, showing the 'Set Objective' field with '\$D\$33', 'To: Min', 'By Changing Variable Cells: \$G\$18:\$Z\$18', and 'Subject to the Constraints' list. The 'Solve' button is highlighted with a red box and a '3' callout. A '1' callout points to the 'Data' tab, and a '2' callout points to the 'Solver' button.

	M	N	O	P	Q	R	S	T
Sample 6	Sample 7	Sample 8	Sample 9	Sample 10	Sample 11	Sample 12	Sample 13	Sample 14
92	10.23	10.2	9.61	5.3	5.2	6.8	2.6	2.8
23	16.81	17.02	16.92	1.9	6.1	5.7	5.8	0.8
28	9.45	9.41	9.73	2.3	7.3	1.5	6.8	0.4
15	4.2	4.18	3.9	5.4	3.0	3.5	9.2	6.7
84	7.31	7.49	7.61	5.6	6.5	6.6	0.9	7.7
84	7.31	7.49	7.61	5.6	6.5	6.6	0.9	7.7
84	7.31	7.49	7.61	5.6	6.5	6.6	0.9	7.7
84	7.31	7.49	7.61	5.6	6.5	6.6	0.9	7.7
0	4.60	3.28	3.29	0.5	4.8	5.8	5.1	1.1
.1	13.4	1.4	4.3	6.1	9.2	13.0	2.7	2.8
0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0
5%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
6	$\alpha 7$	$\alpha 8$	$\alpha 9$	$\alpha 10$	$\alpha 11$	$\alpha 12$	$\alpha 13$	$\alpha 14$
65	0	8E-04	0	0.3029	0.0092	0	0.0006	0
1	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	A	0.36	0.09	3.84	0.00	0.00	1.95
25	0.00	B	6.13	0.36	0.09	3.84	0.00	0.00

Step 3-3

- Calculate the Mathematical Optimization

4. Check “Keep Solver Solution” and then click OK.

Solver Results

Solver found a solution. All Constraints and optimality conditions are satisfied.

Keep Solver Solution

Restore Original Values

Return to Solver Parameters Dialog

Outline Reports

OK Cancel Save Scenario...

Solver found a solution. All Constraints and optimality conditions are satisfied.

When the GRG engine is used, Solver has found at least a local optimal solution. When Simplex LP is used, this means Solver has found a global optimal solution.

Step 4

- Blend the raw materials based on the calculated result and perform a human sensory test if needed.

MO.xls [Compatibility Mode] - Microsoft Excel

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	No.	Max	Min	S.D.	Ave.	Index	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
2	1	12.92	9.61	5.75	5.02	Bitterness	11.29	11.68	9.94	12.30	12.21	12.92	10.23	10.2	9.61	5.3
3	2	17.85	15.49	8.61	7.58	Sourness	15.49	15.89	16.73	17.71	17.85	17.23	16.81	17.02	16.92	1.9
4	3	9.93	9.28	4.87	4.29	Astringency	9.33	9.93	9.39	9.46	9.91	9.28	9.45	9.41	9.73	2.3
5	4	5.15	3.90	2.31	2.02	Aftertaste-B	4.63	4.68	4.09	4.54	5.01	5.15	4.2	4.18	3.9	5.4
6	5	7.61	4.03	3.31	2.83	Saltiness	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6
7	6	7.61	4.03	3.31	2.83	A	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6
8	7	7.61	4.03	3.31	2.83	B	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6
9	8	7.61	4.03	3.31	2.83	C	6.23	4.03	6.93	4.79	6.84	5.34	7.31	7.49	7.61	5.6
10	9	7.61	4.03	3.31	2.83	D	6.23	4.03	6							
11	10	4.98	3.28	2.22	1.93	Cost	4.98	3.99	4.3							
12	11	14.09	1.41	4.90	3.15	Others	14.1	7.5	2							
14				min %	0.08%											
15				Ref of min ratio	5.00%	selected Sample	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
16		# of samples	5	Min ratio	0.00%		5.8%	2.2%	55.5%	0.0%	0.0%	36.5%	0.0%	0.1%	0.0%	0.0%
17				Max ratio	100%		α 1	α 2	α 3	α 4	α 5	α 6	α 7	α 8	α 9	α 10
18	Weight	Residual	Estimate	Residual sum of squares*weight	1.0	Target taste	0.05813	0.022	0.555	0	0	0.365	0	8E-04	0	0.3029
19	1	0.10	11.14	0.01	Bitterness	11.04	0.66	0.25	5.51	0.00	0.00	4.71	0.00	0.01	0.00	0.00
20	1	0.02	16.82	0.00	Sourness	16.80	0.90	0.34	9.28	0.00	0.00	6.29	0.00	0.01	0.00	0.00
21	1	0.50	9.36	0.25	Astringency	8.86	0.54	0.22	5.21	0.00	0.00	3.39	0.00	0.01	0.00	0.00
22	1	0.09	4.52	0.01	Aftertaste-B	4.51	0.27	0.10	2.27	0.00	0.00	1.88	0.00	0.00	0.00	0.00
23	1	0.12	6.25	0.01	Sourness	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00
24	0	0.12	6.25	0.00	A	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00
25	0	0.12	6.25	0.00	B	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00
26	0	0.12	6.25	0.00	C	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00
27	0	0.12	6.25	0.00	D	6.13	0.36	0.09	3.84	0.00	0.00	1.95	0.00	0.01	0.00	0.00
28	1	0.09	4.51	0.01	Cost	4.42	0.29	0.09	2.45	0.00	0.00	1.68	0.00	0.00	0.00	0.00
29	0	7.41	7.41	0.00	Others	0.00	0.82	0.16	1.63	0.00	0.00	4.79	0.00	0.00	0.00	0.00

Optimized blending percentage