

SINTENO AI :: REDEFINING CONSUMER INSIGHTS AND PRODUCT SUCCESS

by YieldWise Inc.

UNCOVERING CONSUMER INSIGHTS IS CHALLENGING

To grow revenue and remain competitive, your business needs to know what consumers think and feel.

However, uncovering insights into consumer preferences and motivations is difficult.



SURVEYS ARE EXPERIMENTS

Taken at face value, survey responses only tell part of the story.

- Responses to survey questions shape **consumer insights**
- How we ask the questions impacts the responses we get
- How we analyze the responses influences the validity of the results



WHAT IS WRONG WITH SURVEY ANALYSIS

The traditional analysis ignores fundamentals such as:

- The difficulty of survey questions varies among questions
- The **ability of survey respondents** varies among respondents
- The dependencies that exist among survey questions

Survey responses are almost always wrongly analyzed, resulting in misleading conclusions ¹

¹ Liddell, T. M., & Kruschke, J. K. (2018). Analyzing ordinal data with metric models: What could possibly go wrong? Journal of Experimental Social Psychology, 79, 328-348.

SURVEY RESPONSES CAN'T BE AVERAGED

		Question 1	VU		UN		S	VS
SL	Survev responses may be coded as numbers like:		VU	U		N	S	VS
		Question 3	VU		UΝ	S		VS
Ve Sc	ery Unsatisfied = 1, Unsatisfied = 2, Neutral = 3, atisfied = 4, Very Satisfied = 5							
Βι	It these codes only look like numbers and must							
be	e treated as ordered categories (or ranks):	Question 1	1		23	1	4	4 5
		Question 2	1	2			34	5
1.	Intervals between adjacent categories may not be equal	Question 3	1		2 3	4		5
\mathcal{O}	Patterns of intervals between adjacent							

2. Patterns of intervals between adjacent categories vary from question to question



A SOLUTION UNLIKE ANY OTHER ON THE MARKET

Survey analysis must go beyond traditional and flawed response analysis to consider the difficulty of the questions and the ability of the respondents.

And that requires **SINTENO AI**.



SINTENO AI :: SOLUTION

SINTENO applies AI and proprietary algorithms to go beyond traditional survey analysis by:

- 1. Converting survey responses to probabilities
- 2. Simultaneously estimating the difficulty of survey questions and the ability of respondents
- 3. Identifying and **eliminating malfunctioning questions**
- 4. Identifying and removing untrustworthy responses
- 5. Establishing causal relations among survey questions and identifying key (foundational) questions.

CONSUMER AND PRODUCT SUCCESS PROFILE

SINTENO creates a Consumer and Product Success Profile by identifying the foundational product attributes that align with consumer preferences, ensuring that the product meets consumer needs now and in the future.



CONSUMER PREFERENCES CARDS

By analyzing consumer preferences, SINTENO **generates recommendations** for enhancing the product or service, ultimately contributing to its success.

Preference Card for Consumer PID003, Preference 1.35, Unsatisfied

Question	Actual Rank	Prob. Choosing Rank 1	Prob. Choosing Rank 2	Prob. Choosing Rank 3	Prob. Choosing Rank 4	Prob. Choosing Rank 5	Most Likely Rank	Consumer & Product Profile	Degree of Satisfaction
On display in store	4	0.00	0.00	0.01	0.22	0.78	5	5	Unsatisfied
Product brand	3	0.00	0.00	0.32	0.59	0.09	4	4	Unsatisfied
Product features	1	0.26	0.74	0.01	0.00	0.00	2	2	Unsatisfied
Product price	4	0.00	0.57	0.42	0.01	0.00	2	2	Satisfied
Product quality	5	0.00	0.00	0.06	0.55	0.38	4	4	Satisfied
TV promotions	3	0.00	0.15	0.75	0.10	0.00	3	3	Satisfied



BENEFITS OF SINTENO

Boost revenue and outpace the competition by:

- Providing true and trustworthy insights into consumer opinions, preferences, and motivations related to product/service attributes and advertising
- Identifying crucial product attributes and aligning them with consumer preferences
- Providing actionable recommendations to improve product and advertising
- Preventing **costly errors** in product and advertising decisions
- Aiding in the **refinement of future surveys** for maximum efficiency

ABOUT US

- YieldWise is a leading provider of innovative analytical solutions specializing in the research and development of <u>sophisticated analytical methods</u> and software tools for various applications such as <u>demand forecasting</u>, design of experiments, <u>survey analysis</u>, statistical quality control, <u>survival analysis</u>, time series analysis, and forecasting.
- YieldWise Inc., has developed an analytical platform that supports applications like SINTENO. The YieldWise application suite also includes:

<u>A-S</u>CALA AI :: focuses on redefining student success

EXOUSIA AI :: focuses on redefining employee success





CREATING FAIR AND EFFECTIVE ASSESSMENTS



Georg Rasch Danish Mathematician and Psychometrician

Applying the Rasch Model

The polytomous Rasch model assumes that the probability of a respondent endorsing a particular response category (or rank) on an item depends on:

- I. The respondent's ability: Higher ability respondents are more likely to endorse higher response categories.
- 2. The item's difficulty: More difficult items require higher levels of the latent trait to be endorsed.



ASSESSING TRUSTWORTHINESS OF RESPONSES

Item Characteristic Curve illustrates the probability distributions for endorsing the response category to an item (question) that aligns with respondent ability and item difficulty.

Example: A respondent with an ability level of 0 is expected to choose Category 3 for an item with a difficulty level of -1.906, as it has a probability of 0.75. Instead, the respondent chose Category 4 (marked by a red dot on Category 4 curve), which has a probability of only 0.2. This inconsistency indicates that the response may not be reliable.





SOME ATTRIBUTES ARE MORE IMPORTANT THAN OTHERS

Relational Bayesian Networks

Revealing the causal relationships among items (questions) is essential for understanding the product attributes that consumers prioritize when making purchase decisions.



In this example, the three foundational attributes of the product and its advertising are:

"On Display in Store" "Product Price" "Product Features"

SINTENO INPUT, PROCESSING, OUTPUT



SINTENO accurately identifies consumer preferences and evaluates product strengths and weaknesses by conducting a series of brief, consecutive surveys. By doing so, SINTENO eliminates the bias often associated with sample under-representation. This method yields a comprehensive Consumer and Product Success Profile, allowing businesses to understand the quantifiable impact of foundational items on consumer choices.

TAKING INTO ACCOUNT THE ABILITY OF RESPONDENTS AND THE DIFFICULTY OF QUESTIONS

Questions Respondents	Question 1	Question 2	Question 3	Question 4	Question 5	
Respondent 1	2	1	1	2	1	
Respondent 2	2	2	4	2	1	
Respondent 3	5	3	3	3	1	Ability of Respondent 3
Respondent 4	5	3	3	4	1	
Respondent N	5	3	4	5	2	
			Difficulty of Question 3			

Respondent Ability is the level of the latent trait possessed by an individual, and Question (Item) Difficulty is the level of the latent trait required to endorse a particular response category (or rank).

ABILITY AND DIFFICULTY ILLUSTRATED

These graphs illustrate the quality of the audience of respondents and the quality of survey questions. The ability (or preferences) of consumers and the difficulty of items clustered in horizontal lines indicate the desired quality of the audience and the survey questions.





CONSUMER SATISFACTION WITH THE PRODUCT

SINTENO estimates consumer satisfaction using a Consumer and Product Success Profile.

- Strength: the rank (or category) that is expected to be chosen by the respondent for an item (question) is higher than the rank defined in the Consumer and Product Success Profile (see slide 8).
- Fit: the expected rank is the same as the rank in the Profile.
- Weakness: the expected rank is significantly lower than the rank defined by the Profile.

For example: the "Product Features" item has about 40% of respondents that are in the Fit group, while the "Product Price" item has about 78% of respondents that are in the Strength and Fit groups.



VALIDATION FROM ACADEMIA

Methodology Presented to Acclaim at Multiple Analytics Conferences Across Industries:

- 1. Academy of Market Research Conference, Stirling University, Scotland (2018)
- 2. ISMS Marketing Science Conference, Rome University, Italy (2019)
- 3. IAEA2019 Conference, Baku, Azerbaijan (2019)
- 4. 20th Annual Conference AEA Europe, IAVE, Lisbon, Portugal (2019)
- 5. Nashville Analytics Summit, OMNI Center, USA (2021)

Sample Reaction from Colleagues

"It is mathematical statistics at its best, showing how accurate processing of raw survey data yields valuable conclusions ... It is definitely a major improvement compared to the simple average scores that we usually provide ... It is surely a major step forward."

Prof. Xavier Giménez, Departament de Ciència de Materials i Química Física & Institut de Química Teòrica i Computacional (IQTCUB), Universitat de Barcelona, Spain



THE SINTENO METHOD

IDENTIFY

- Malfunctioning survey items and not trustworthy responses
- Items' Difficulty and Respondents' ability
- Foundational Items

GENERATE

- Causal relations among survey items
- Consumer Preference Cards

DELIVER

- Consumer & Product
 Success Profiles
- Product Strength and Weaknesses



EXAMPLE: CONSUMER SATISFACTION

Analysis of Survey Raw Scores

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SINTENO Results

- **2.1%** of consumers have **Neutral** attitude,
- 54.4% of consumers are Very Unsatisfied with the

People 20% Unsatisfied Unsatisfied Neutral Satisfied Very Satisfied

Score Averaging Results

- 39.1% of consumers have Neutral attitude,
- **15.2%** of consumers are Very Unsatisfied with the product.





product.