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Indoor Agriculture's Value Proposition: Keys to Profit through Revenue Enhancement

Part 2/2: IA Value Proposition: Consumer Attitudes and Willingness to Pay

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Consumer "Varieties": Market Segments based on IA Attitudes and Willingness-to-Pay

What attitudes do consumers have about Indoor agriculture (IA), and are they willing to pay for IA leafy green attributes?

MSU OptimIA Economics team did an online survey during July and August 2021 .
We got a representative sample of 2,114 responses from U. S. leafy green consumers

Our analysis shows that consumers can be divided into two types of market segments.

1. Market segments arising from **consumer attitudes about IA**.
   Resulting Segments: **IA Skeptical, IA Accepting, IA Supportive, and IA Engaged**

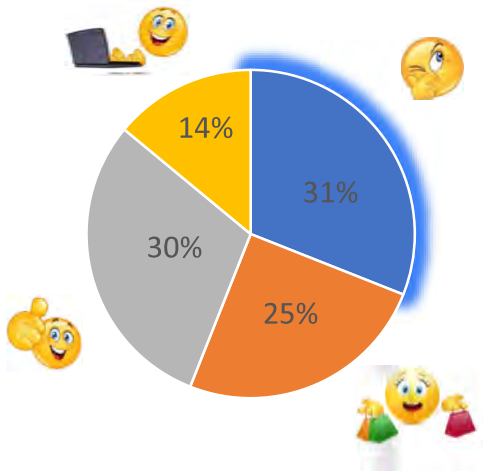
2. Market segments arising from a choice experiment about **consumer willingness to pay (WTP) for leafy green attributes.**
   Resulting Segments: **Quality Seekers, Price Conscious, and Focused Practicals**

Key Question: Do consumer IA attitudes translate in willingness to pay?

Agree/Disagree Attitude Statements

Statements
Indoor agriculture (IA) makes it possible to grow higher quality leafy greens than field farming and greenhouse.
Indoor agriculture (IA) employs less labor than field farming and greenhouse.
Indoor agriculture (IA) makes it easier to produce leafy greens locally than field farming and greenhouse.
Indoor agriculture (IA) production is less harmful to the environment compared to field farming and greenhouse.
Indoor agriculture (IA) will be a mainstream production method in the future.
Indoor agriculture (IA) is an artificial and unnatural way of growing crops.
I have enough prior knowledge of Indoor agriculture (IA) to feel comfortable about my answers to the last 6 questions.
Given what I know about Indoor Agriculture (IA), I am willing to consume leafy greens grown in this type of farm.

IA Consumer Segments based on IA Attitudes*



IA Skeptical

Least likely to consume IA produce

Moderate IA knowledge

Slightly negative towards IA **potential benefits**** while **leaning toward IA as artificial/unnatural**

Tends to be younger, less educated, lower income, and more rural (26%)

Top leafy green attributes***: freshness (85%), taste (64%), price (49%)

74% buy leafy greens at supermarkets

**Statistically significant segments based on 2,114 participants in US representative consumer panel. Preliminary results. Confidential. Only for use by OptimIA member firms and researchers. Not for distribution or citation.*

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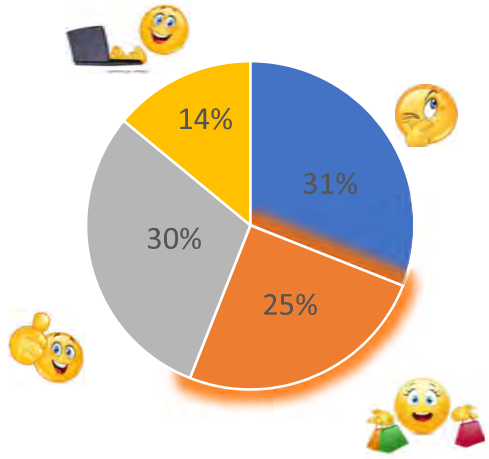

IA Accepting

Likely to consume IA produce

Least IA knowledge

Slightly positive towards IA **potential benefits**** while **neutral on IA as artificial/unnatural**

Tends to be older, female, well educated, less diverse, and suburban

Top leafy green attributes*:** Freshness (88%), taste (65%), price (60%; highest % among segments)

82% buy leafy greens at supermarkets

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IA Consumer Segments based on IA Attitudes*

IA Supportive

Highly likely to consume IA produce

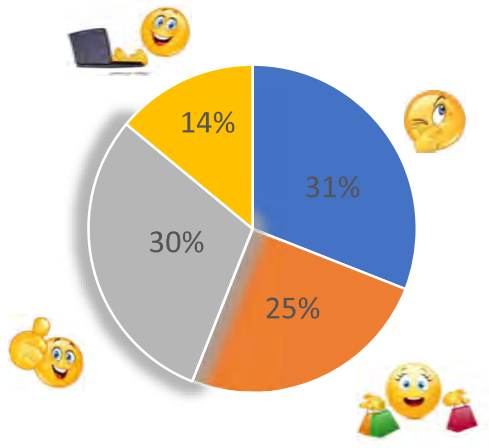
High IA knowledge

Strongly positive towards IA **potential benefits**** while **not seeing IA as artificial/unnatural**

Tends to be older, well educated, less diverse, and higher income.

Top leafy green attributes*:** freshness (94%; highest among segments), taste (65%), price (52%) and consistent quality (51%).

81% buy leafy greens at supermarkets



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IA potential benefits used in survey questions:
- Higher quality produce
- Less labor usage
- Easier to grow locally
- Less environmental effect
- Mainstream in the future

***Number in parentheses represent % of segment members who cited the attribute as important in leafy green purchase

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IA Consumer Segments based on IA Attitudes*

IA Engaged

Most likely to consume IA produce

Highest IA knowledge

Most positive towards IA **potential benefits**** while **seeing IA as artificial/unnatural which is a positive for them**

Tends to be younger, male, higher education, most diverse, and urban.

42% eat leafy greens daily (twice rate of other segments).

Top Leafy green attributes***:

Freshness (83%),

taste (82%; highest among segments),

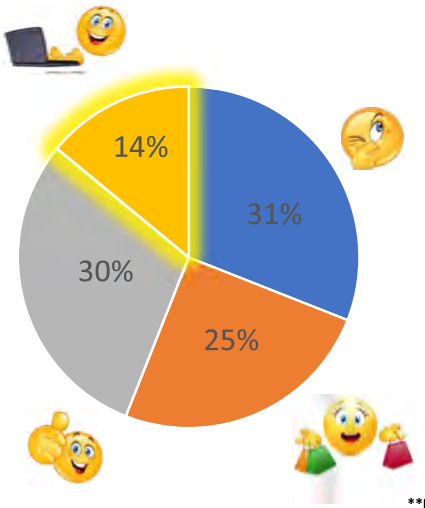
food safety (64%; highest),

nutritional value (60%; highest),

locally grown (59%; highest),

lower environmental impact (43%; twice other segments)

Compared to other groups this is more likely to buy leafy greens from food subscription/delivery services, gourmet food stores, natural grocery stores, club stores, and mass merchandisers, although 62% also buy at supermarkets.



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IA Supportive

Highly likely to consume IA produce

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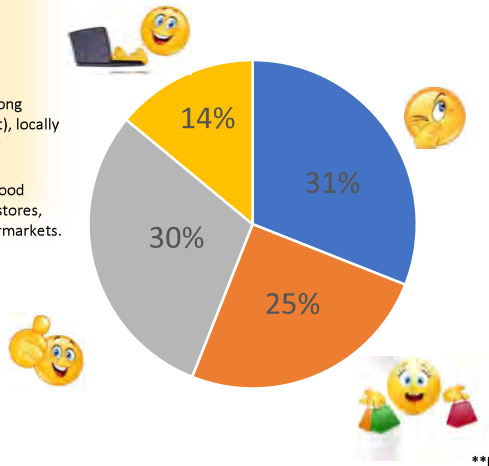

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Choice Experiment: Willingness to Pay (WTP)

The following questions will be referring to these three different **agricultural systems** used to grow leafy greens.

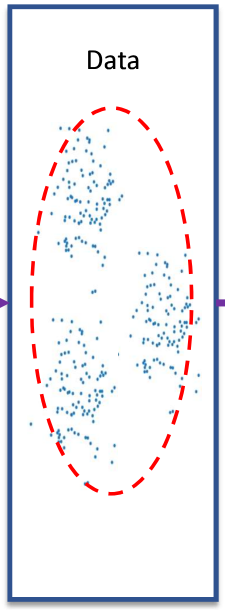
Field Farming	Greenhouse	Indoor Agriculture (IA)

Please consider the following hypothetical purchasing scenario for 4.5 ounces of green leaf lettuce. You may buy one of the three lettuce options, or you may choose to buy none of them.

IA Consumer Segments based on WTP

Responses from Choice Experiment

Attributes	Levels		
Production Method	IA grown	GH grown	FF grown
Price	$2.9 / 4.5 oz. $3.9 / 4.5 oz. $4.9 / 4.5 oz. $5.9 / 4.5 oz.		$1.9 / 4.5 oz. $2.9 / 4.5 oz.
Freshness	OK Good Very good		
Taste	OK Good Very good		
Nutrient level	None 20% more 50% more		
Food safety	None Food safety certified		



WTP for Attributes

- Quality seekers
- Price conscious
- Focused practicals

Consumers' preferences for IA, GH and FF leafy greens attributes: aggregate level

Leafy green consumers derive positive utility from each of these four quality attributes

More so from *Taste* and *Freshness* than *Nutrient levels* and *Food Safety*

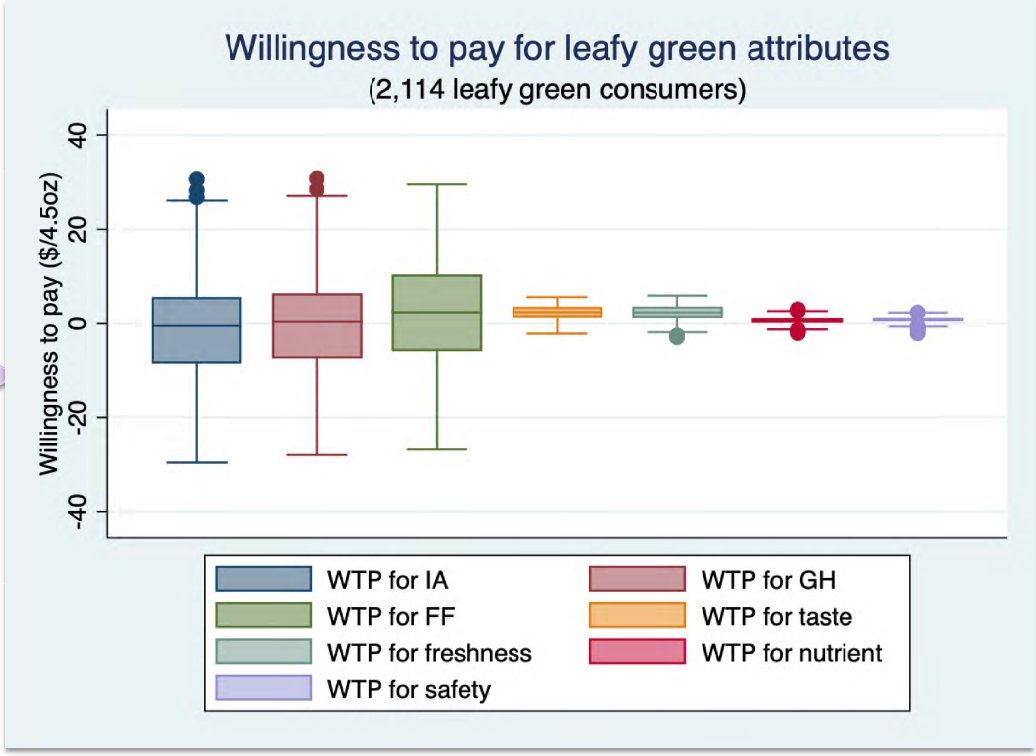
At aggregate level, WTP for *Taste* is about 3.4 times greater than mean WTP for *Nutrient Level*

Significant heterogeneity across three production methods

Three varieties of Leafy Green Consumers

"Quality seekers" (55.1%)	"Price conscious" (26.3%)	"Focused practicals" (18.6%)
• Are the least price sensitive • Show highest WTP values for <u>all</u> lettuce attributes • Value most *taste* and *freshness* • Highest value to all production methods (ordered GH, FF and IA): • Derive positive utility from knowing how their leafy greens are produced	• Are the most price sensitive • Somewhat value production methods • Value more *freshness*, followed by *taste* and *food safety*. • WTP for the leafy green quality attributes are smaller than "quality seekers" given their price sensitivity.	• Are moderately price sensitive • Practical buyers focused on fewer attributes: *taste* and *freshness* • Do not derive utility from knowing where their leafy greens are produced • Value quality attributes – not production systems • Least concerned between classes with *nutrient level* and *food safety*

Distribution!



Demographics: Generations and Living Area

WTP for leafy green attributes vary significantly by generations

WTP for IA was highest for millennials, lowest for baby boomers

WTP for *taste, freshness, nutrient level, and food safety* are positive across all generations, and higher for younger generation

WTP for leafy green attributes vary significantly across urban-, suburban-, and rural-dwellers

WTP for IA was highest for urban-dwelling respondents

Expanding IA farms in urban areas is costly, but there is substantial premium in urban markets

Generations defined by ages in 2021:
Gen Z (18-25), Millennials (26-40),Gen X (41-55), Boomer (56 and over)

Conclusions about WTP

- Three distinctive leafy green consumer groups: '**quality seekers**', '**price conscious**', and '**focused practicals**'.
- '**quality seekers**' (55.1%) seek *quality* valuing most all quality attributes, are willing to pay the highest premium for IA produce but are still willing to pay more for lettuce grown in GH or FF.
- Consensus between consumers is lower regarding their perceptions of production methods than of conventional quality attributes.
- ***Taste*** and ***Freshness*** are the **most valued attributes**.
- *Nutrient level* was the least valued quality attribute in all data segments in relation to freshness, food safety and taste.
- IA-produced leafy green consumers likely belong to the **Millennial** cohort and live in **Urban areas**.

		WTP Segments Choices			
	Do IA attitudes agree with WTP choices?	Quality Seekers (55% of sample)	Price Conscious (27% of sample)	Focused Practicals (18% of sample)	Total
IA Attitude Segments Perceptions	IA Skeptical (31% of sample)	48%	32%	20%	100%
	IA Accepting (25% of sample)	33%	35%	32%	100%
	IA Supportive (30% of sample)	55%	28%	16%	100%
	IA Engaged (14% of sample)	89%	7%	4%	100%

IA Skeptical, who would seem to be ideal candidates to be focused practicals, are about half quality seekers, 1/3 price conscience and only 1/5 focused practicals.

IA Accepting are the most price conscious segment by attitude. They spread out about 1/3 each in the WTP segments.

IA Engaged are overwhelmingly Quality Seekers. IA Attitudes and WTP closely match.

IA Supportive are majority Quality Seekers but many split into Price and Focus as they move from IA attitudes to WTP choices.

IA's Value Proposition

- IA can enhance taste, freshness, and other key attributes.
  - Consumers value these attributes highly.
  - Consumers are however diverse.
    - In their attitudes toward IA: IA skeptical, IA accepting, IA supportive and IA engaged
    - In their willingness to pay for IA: Quality Seekers, Price Conscious, and Focused Practicals
- Each IA farm needs to create a marketing strategy that maximizes its revenue from the consumers targeted by its produce attributes.
  - Each major decision made about capital and operations will have cost AND revenue impacts.

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