

Enhancing Water Footprint Communication in the Wood-Processing Industry through Gamification

WoodEMA 2026 | Bioeconomy Moves Forward: Perspectives on Wood Product Markets



Objectives and structure

Objective 1

Frame water footprint as a strategic communication issue for household wood products.

Objective 2

Present the controlled pretest-posttest design and the two communication formats.

Objective 3

Report the main effects of gamification on trust, interpretation and behavioural readiness.

Talk flow

Problem

why disclosure is not enough

Design

two formats, same facts

Results

scale and knowledge outcomes

Meaning

trust and interpretation

Implications

managerial use



Why the topic matters for wood-processing markets

Resource pressure

Freshwater stress is increasingly relevant for resource-dependent industries and forest-based value chains.

Consumer interpretation

Environmental indicators only matter commercially when consumers understand and trust them.

Market transition

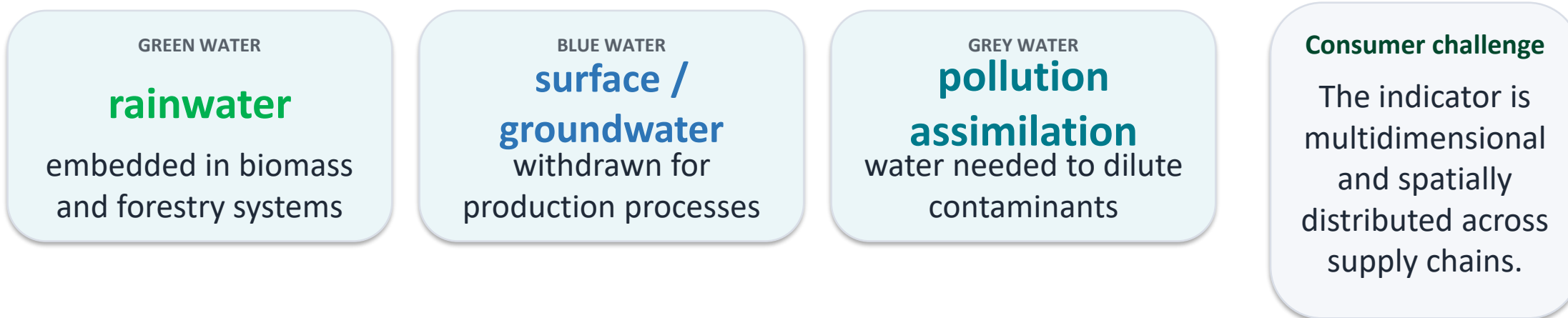
Lower-impact products need communication formats that support acceptance and willingness to pay.

Core problem

Water-footprint data do not automatically become meaningful consumer information.

Water footprint as a supply-chain indicator

Three components of freshwater use



Communication problem: disclosure alone is not enough

Clarity

Consumers need simple, specific and interpretable information.

Credibility

Environmental claims must be processed as trustworthy and diagnostic.

Relevance

Information must connect to product choice, price and perceived value.

Communication task

Convert environmental accounting into an actionable consumer signal.

Gamification logic in this study

Definition used **Game-design elements in a non-game communication context.**



Important caution

Gamification is a communication-enhancement mechanism, not a separate sustainability claim.

Design principle

The factual environmental content was held constant in both groups.

Research question and contribution

Research question

Does gamified communication of water-footprint information outperform standard non-gamified disclosure?

Main contribution

Indicator context

Water footprint as a supply-chain embedded environmental indicator.

Communication test

Gamified vs non-gamified format with identical facts.

Market relevance

Outcomes include credibility, intention and willingness to pay.

What is new: format effect, not content effect

Hypotheses

H1

Water-footprint communication improves consumer evaluations of household wood products from pretest to posttest.

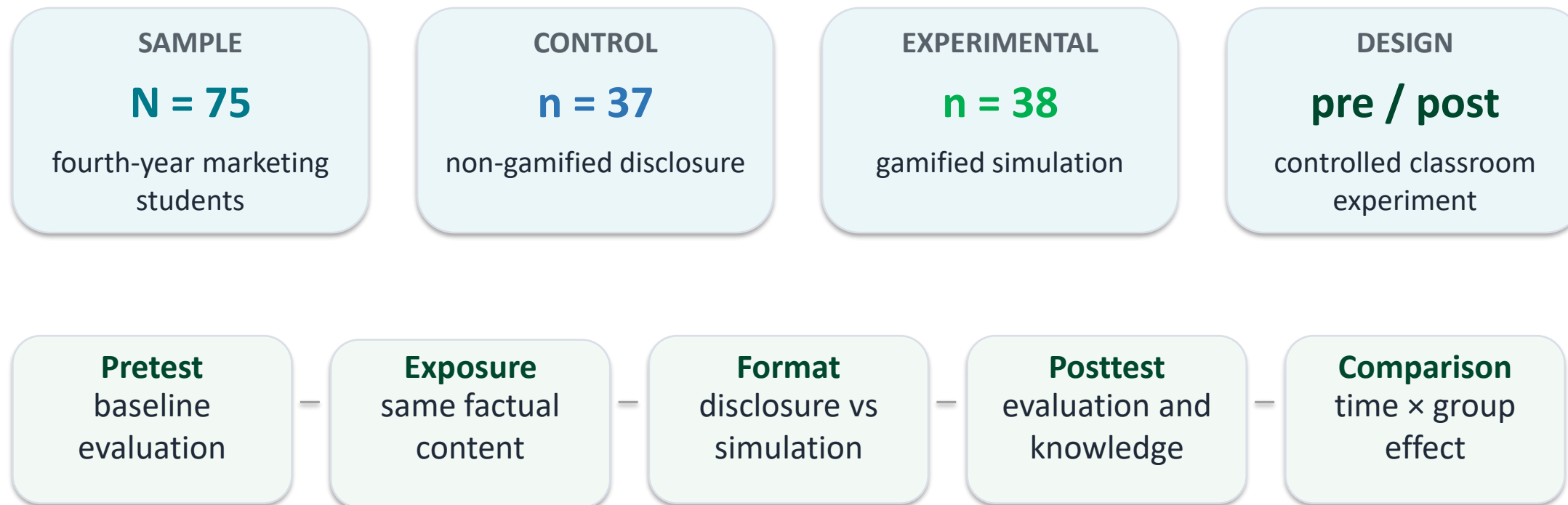
H2

Gamified communication produces stronger gains in perceived credibility, engagement, purchase intention and willingness to pay.

H3

Gamified communication produces higher objective comprehension, but the expected effect is smaller than for attitudinal and behavioural outcomes.

Experimental design at a glance



Interpretation rule

The sample supports controlled mechanism testing, not population-level market estimation.

Two communication conditions

Non-gamified control format

- static informational disclosure
- identical factual water-footprint content
- conventional explanation of lower-impact household wood products
- no interactive feedback or game-like progress cues

Gamified experimental format

- interactive simulation
- same factual content and product logic
- feedback and comparison cues
- guided decision scenario and progress-oriented structure

Manipulation check: the experimental format was perceived as substantially more interactive and game-like.

Measurement and analysis

11/20

Attitudinal outcomes

Perceived sustainability
Perceived credibility
Subjective comprehension

Behavioural readiness

Purchase intention
Willingness to pay
Price-premium categories

Objective knowledge

Three-item water-footprint
comprehension test

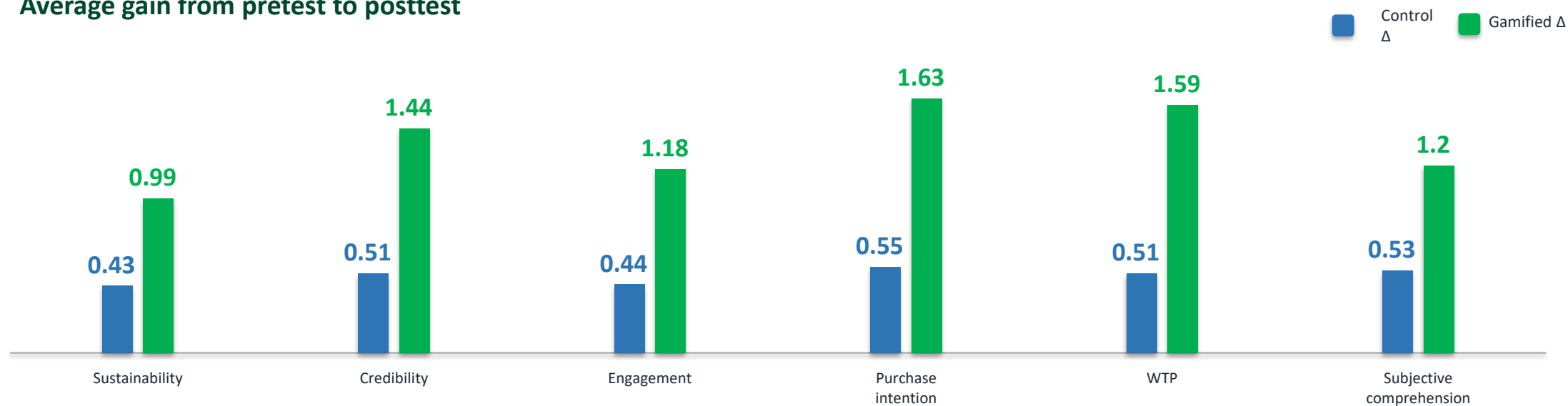
Statistical focus

Pretest-posttest change and time $\times$ group interaction; partial eta squared (η^2) as effect-size indicator.

Result pattern in one sentence

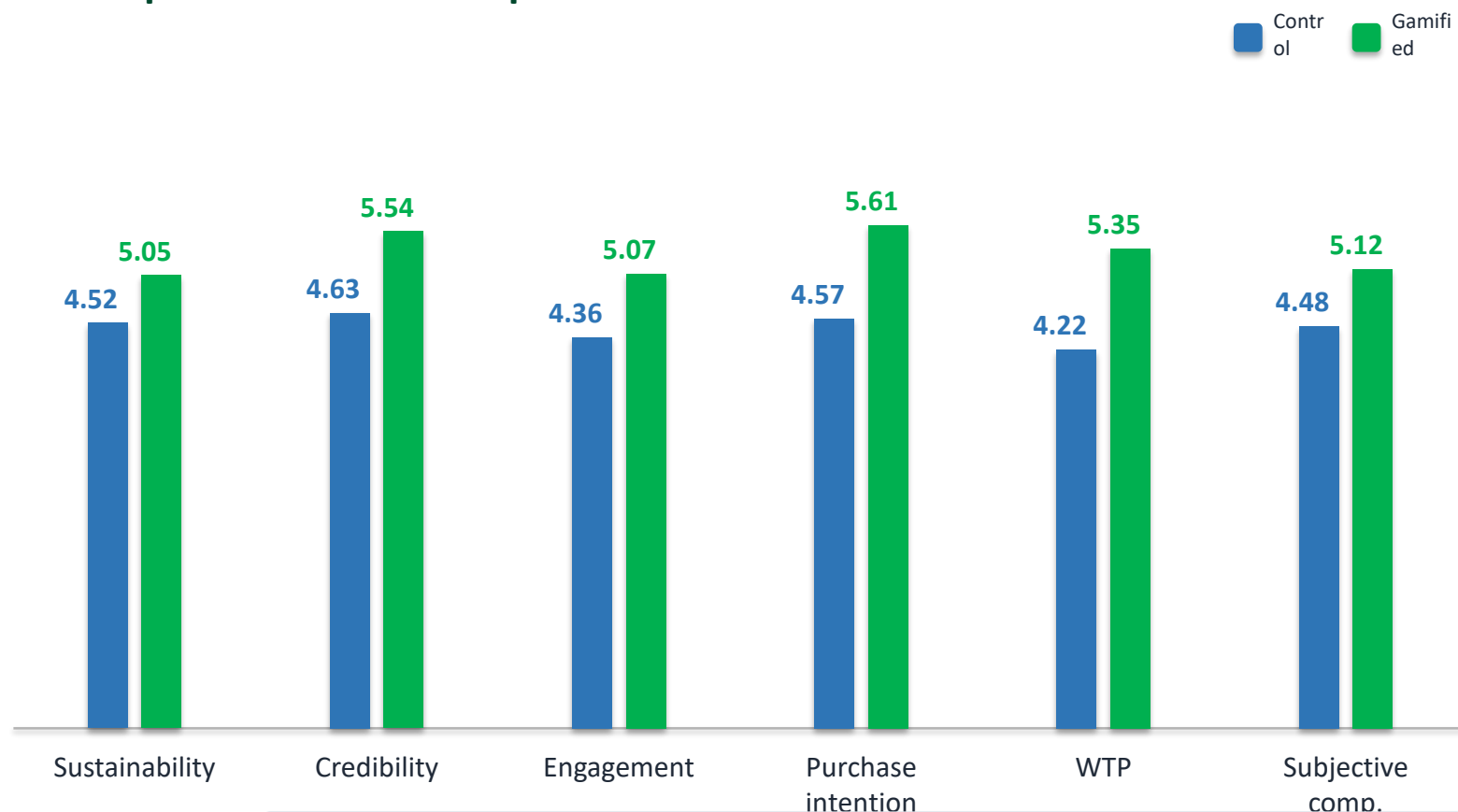
Both formats improved evaluations, but the gamified format produced stronger gains across the main attitudinal and behavioural outcomes.

Average gain from pretest to posttest



Key posttest outcomes

Mean posttest score on 7-point scales



Largest posttest gaps

Purchase intention
+1.04

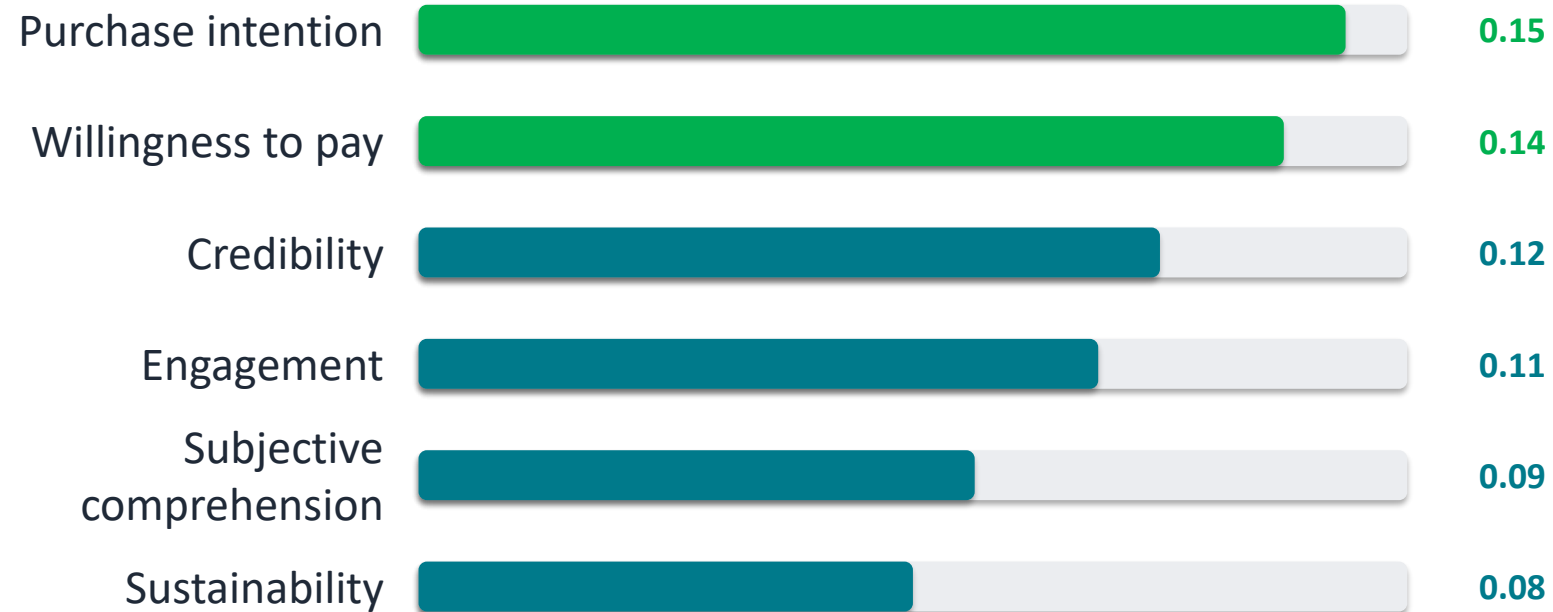
Willingness to pay
+1.13

Perceived credibility
+0.91

The strongest differences are market-relevant, not only educational.

Interaction diagnostics: where the added effect is strongest

Partial eta squared (η^2) for the time $\times$ group interaction



Reading the pattern

The largest effects are concentrated in behavioural readiness and credibility.

p-values for these outcomes: .002 to .018

Objective comprehension: positive but modest advantage

CONTROL POSTTEST

75.7%

correct answers on each item:
28/37

GAMIFIED POSTTEST

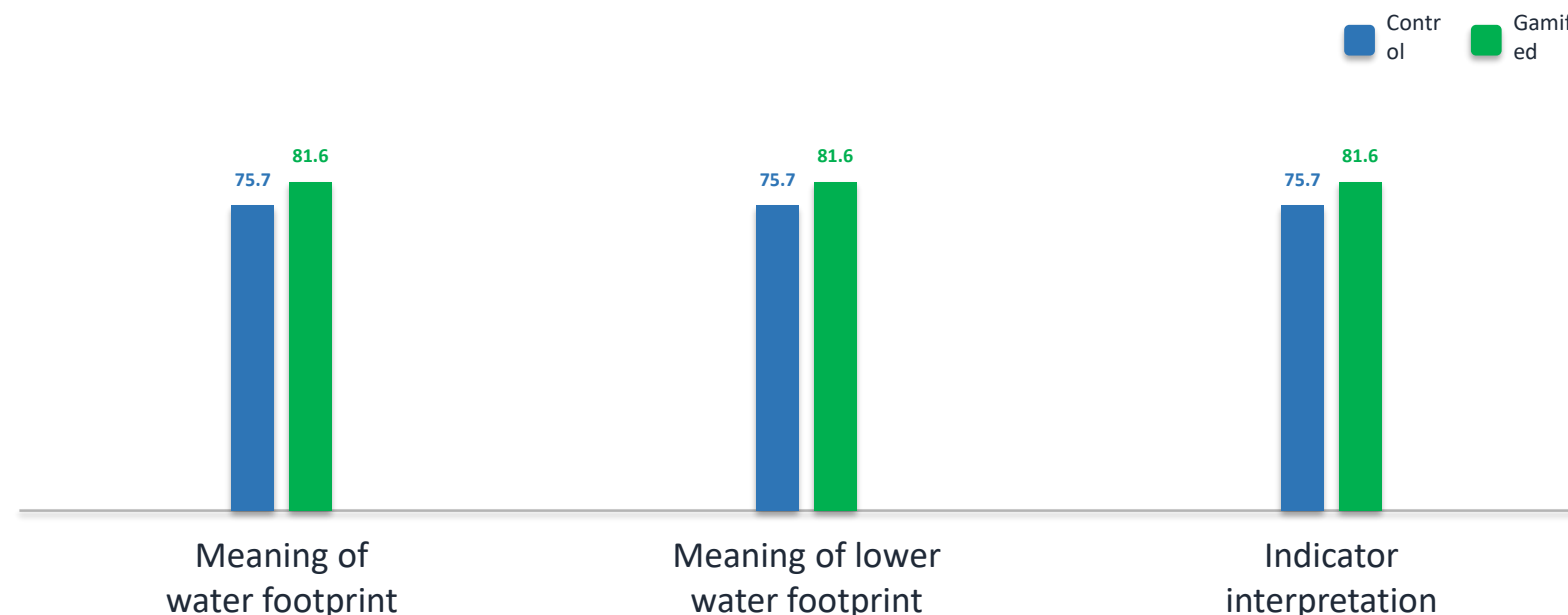
81.6%

correct answers on each item:
31/38

OBJECTIVE INDEX

2.45 vs 2.27

gamified vs control on 0–3
scale

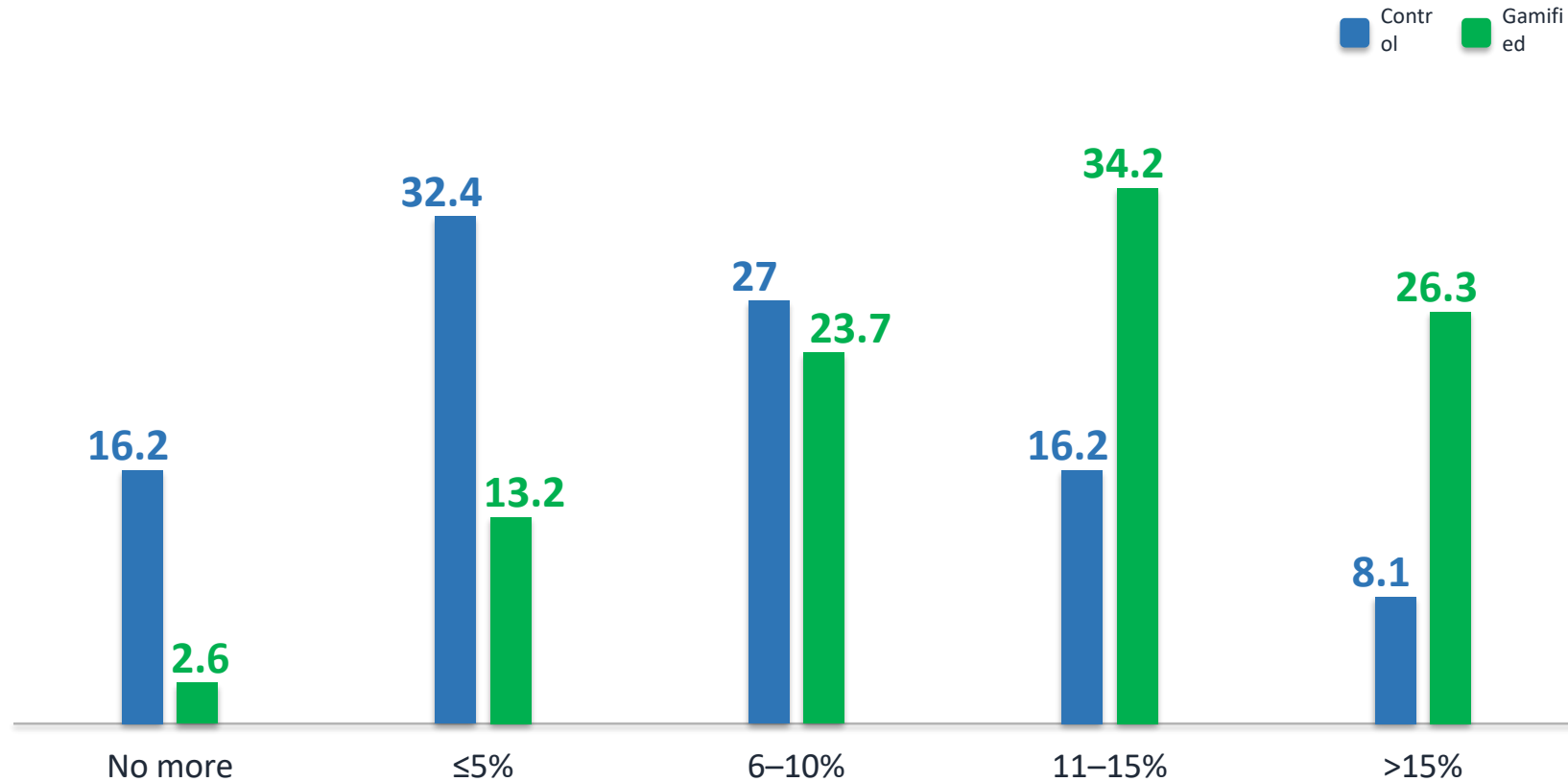


Interpretation

H3 is supported only partially: knowledge improves, but less than trust and behavioural readiness.

Willingness to pay: stronger shift to higher premiums

Posttest distribution by price-premium category



Key comparison
 11–15% more
 16.2% → 34.2%

>15% more
 8.1% → 26.3%

$\chi^2(4) = 12.84$
 $p = .012$

What the findings mean

Main interpretation

Gamification works primarily as a sense-making and trust-building mechanism.

Not mainly

a tool for increasing factual recall alone

More strongly

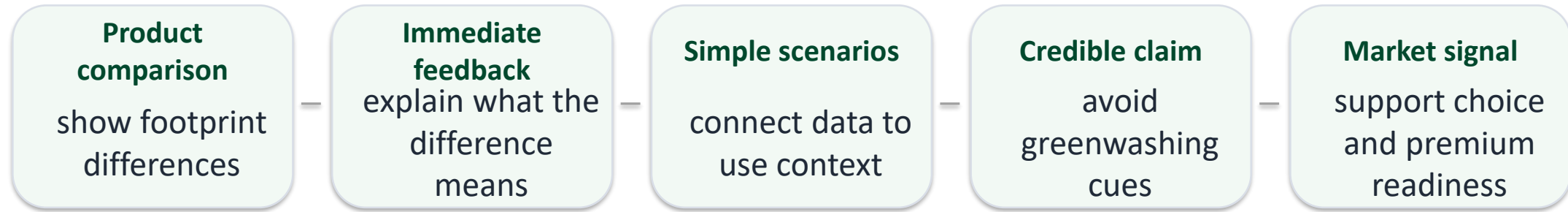
a way to improve interpretation, credibility and engagement

Commercially

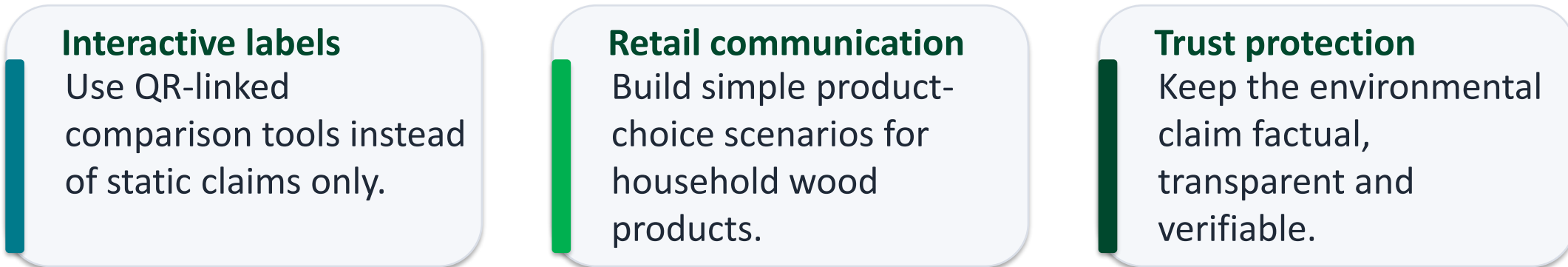
a route to stronger product evaluation and higher price-premium readiness

The key mechanism is interpretive accessibility, not novelty alone.

Managerial implications for wood-processing firms



Practical applications



Gamification should clarify the claim; it should not decorate or exaggerate it.

Limitations and future research

Limitations

- controlled student-consumer sample
- immediate post-exposure reactions
- no delayed behavioural test
- possible novelty effect
- summary-level conference-paper statistics

Future research

- larger consumer samples
- delayed posttests
- simulated or real product-choice tasks
- robustness and item-level diagnostics
- tests across wood-product categories

Generalize the mechanism cautiously, not the market-size estimates.

- 1** Water-footprint communication can improve consumer evaluations of household wood products.
- 2** Gamified formats produced stronger gains in credibility, engagement, purchase intention and willingness to pay.
- 3** The main effect is not only knowledge acquisition; it is trust, interpretation and perceived relevance.

Thank you. Questions?

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