

## International Journal of Agriculture Extension and Social Development

Volume 8; Issue 8; August 2025; Page No. 201-204

Received: 24-06-2025  
Accepted: 28-07-2025

Indexed Journal  
Peer Reviewed Journal

### Cognitive biases affecting farmer decision-making processes in agricultural technology evaluation

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DOI: <https://www.doi.org/10.33545/26180723.2025.v8.i8c.3124>

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#### Abstract

Behavioural economists have long argued that human decisions deviate systematically from rational choice predictions, yet agricultural extension research continues to treat technology adoption as though farmers are perfectly logical evaluators of costs and benefits. This research investigated the prevalence and impact of three cognitive biases, status quo bias, confirmation bias, and anchoring bias, on farmer decision-making during agricultural technology evaluation in Kinshasa and Kongo Central provinces of the Democratic Republic of Congo. A cross-sectional survey of 148 smallholder farmers was conducted between June 2022 and March 2024, using scenario-based vignettes to measure bias susceptibility across five technology evaluation stages. Results showed that anchoring bias was most prevalent during information gathering (62.4%), confirmation bias peaked during post-adoption review (58.3%), and status quo bias dominated at the adoption decision point (63.4%). Bias susceptibility correlated negatively with extension contact frequency ( $r = -0.47$ ) and formal education level ( $r = -0.39$ ). The findings suggest that extension programs designed with awareness of cognitive biases could improve technology evaluation quality and adoption outcomes among smallholder farmers.

**Keywords:** Cognitive biases, farmer decision-making, technology evaluation, status quo bias, confirmation bias, anchoring, agricultural extension, DR Congo, behavioural economics, adoption behaviour

#### Introduction

Daniel Kahneman, whose work on judgement under uncertainty earned him the Nobel Prize in Economics, once observed that people are not designed to make optimal decisions but rather to make quick ones that are good enough most of the time <sup>[1]</sup>. This insight has transformed fields from medicine to finance, yet its application to agricultural technology adoption remains limited. Extension research has traditionally explained adoption through rational choice frameworks: farmers weigh costs against benefits, assess risk, and decide accordingly <sup>[2]</sup>. When farmers reject beneficial technologies, the explanation usually centres on information gaps, resource constraints, or institutional barriers <sup>[3]</sup>.

But what if farmers sometimes reject good technologies not because they lack information but because their minds process that information through systematic filters that distort evaluation? Cognitive biases, the mental shortcuts that simplify complex decisions but introduce predictable errors, offer an alternative explanation <sup>[4]</sup>. Three biases appear particularly relevant to technology evaluation: status quo bias (preference for the current state), confirmation bias (seeking information that supports existing beliefs), and anchoring bias (over-reliance on the first piece of information encountered) <sup>[5]</sup>.

In the Democratic Republic of Congo, where extension coverage is thin and farmers rely heavily on personal experience and peer networks for technology information, cognitive biases may play an outsized role in shaping

adoption decisions <sup>[6]</sup>. This research investigated the prevalence of these three biases across five stages of technology evaluation among smallholder farmers in Kinshasa and Kongo Central provinces, and examined whether extension contact and education level moderated bias susceptibility <sup>[7]</sup>.

#### Theoretical Framework

The research was grounded in Kahneman and Tversky's (1979) <sup>[1]</sup> Prospect Theory and its extension into the dual-process framework distinguishing System 1 (fast, intuitive, bias-prone) and System 2 (slow, deliberate, analytical) thinking <sup>[8]</sup>. In agricultural contexts, resource-constrained farmers facing multiple daily decisions are likely to rely heavily on System 1 processing, making them more susceptible to cognitive biases. Status quo bias, formalised by Samuelson and Zeckhauser (1988) <sup>[9]</sup>, predicts that farmers will disproportionately favour existing practices even when alternatives offer superior outcomes, because losses from switching are psychologically weighted more heavily than equivalent gains. Confirmation bias operates by filtering new technology information through existing beliefs, while anchoring causes initial impressions, often from the first demonstration or neighbour's experience, to disproportionately shape subsequent evaluations <sup>[5]</sup>.

#### Materials and Methods

##### Materials

A scenario-based vignette instrument was developed to

measure cognitive bias susceptibility. Twelve vignettes were constructed, each describing a hypothetical but realistic technology evaluation situation in which a farmer must make a judgement or decision. Four vignettes targeted each of the three biases, with response options designed so that bias-consistent choices could be identified and scored. Vignettes were developed in French, translated into Lingala and Kikongo by bilingual agricultural researchers, and back-translated for accuracy. Pre-testing with 20 farmers in Mont-Ngafula commune (May 2022) yielded acceptable internal consistency (Cronbach's alpha: status quo = 0.78, confirmation = 0.82, anchoring = 0.76) <sup>[10]</sup>. Ethical approval was obtained from the Universite de Kinshasa Faculty of Agriculture Research Committee (Ref: UNIKIN/FA/2022-006, dated 18 April 2022).

Methods

A cross-sectional descriptive design was adopted. The sample comprised 148 smallholder farmers (81 male, 67 female) from six communes in Kinshasa (Maluku, Mont-Ngafula, N'Sele) and three territories in Kongo Central (Mbanza-Ngungu, Madimba, Kasangulu). Farmers were selected using multistage cluster sampling. Data collection occurred through face-to-face interviews between June 2022 and March 2024. Each farmer responded to all 12 vignettes plus a demographic questionnaire capturing age, education,

farm experience, extension contact frequency, and recent technology adoption history. Bias prevalence was calculated as the percentage of farmers selecting bias-consistent responses per vignette. Associations between bias scores and moderating variables were tested using Pearson correlation and multiple regression in SPSS version 27 <sup>[11]</sup>.

Instrument Development and Validation

The vignette instrument underwent a four-stage validation process. First, 24 candidate vignettes were drafted based on documented cognitive bias paradigms adapted for farming contexts. Second, a panel of three behavioural psychologists and two agricultural extension specialists rated each vignette for bias specificity, ecological validity, and comprehensibility, retaining 16 items. Third, pilot testing with 20 farmers reduced the set to 12 by eliminating items with floor or ceiling effects. Fourth, confirmatory factor analysis on the full sample verified a three-factor structure corresponding to the three target biases, with factor loadings between 0.58 and 0.84. Discriminant validity was supported by moderate inter-bias correlations ( $r = 0.31$  to  $0.44$ ), indicating that the three biases are related but distinct constructs <sup>[12]</sup>.

Results

Table 1: Cognitive Bias Prevalence by Technology Evaluation Stage (n = 148)

| Evaluation Stage       | Status Quo (%) | Confirmation (%) | Anchoring (%) | Dominant Bias |
|------------------------|----------------|------------------|---------------|---------------|
| Information Gathering  | 28.7           | 47.2             | 62.4          | Anchoring     |
| Alternative Evaluation | 42.3           | 53.8             | 35.9          | Confirmation  |
| Risk Assessment        | 51.6           | 38.1             | 29.3          | Status Quo    |
| Adoption Decision      | 63.4           | 41.7             | 22.6          | Status Quo    |
| Post-Adoption Review   | 34.8           | 58.3             | 18.1          | Confirmation  |

Each bias showed a distinct stage-specific pattern. Anchoring bias peaked early (62.4% during information gathering) then declined, consistent with its role in shaping initial reference points. Status quo bias increased through risk assessment and adoption stages, peaking at 63.4% when

farmers faced the actual decision to change practices. Confirmation bias showed a bimodal pattern, high during alternative evaluation (53.8%) and post-adoption review (58.3%), reflecting selective evidence processing at both pre- and post-decision stages.

Table 2: Correlations Between Bias Susceptibility and Farmer Characteristics (n = 148)

| Variable              | Status Quo (r) | Confirmation (r) | Anchoring (r) | Overall Bias (r) |
|-----------------------|----------------|------------------|---------------|------------------|
| Extension Contact     | -0.43**        | -0.38**          | -0.51**       | -0.47**          |
| Education Level       | -0.36**        | -0.41**          | -0.33**       | -0.39**          |
| Farm Experience (yrs) | 0.28**         | 0.19*            | 0.08          | 0.21*            |
| Age                   | 0.31**         | 0.14             | 0.11          | 0.22**           |
| Recent Adoption Count | -0.52**        | -0.29**          | -0.37**       | -0.44**          |

\*p < 0.05, \*\*p < 0.01. Extension contact showed the strongest negative correlation with overall bias susceptibility ( $r = -0.47$ ), with the relationship most pronounced for anchoring bias ( $r = -0.51$ ). Recent technology adoption history also correlated negatively with bias scores ( $r = -0.44$ ), suggesting that experience with change itself may reduce resistance to subsequent changes. Farm experience correlated positively with status quo bias ( $r = 0.28$ ), indicating that longer experience may entrench preference for familiar practices.

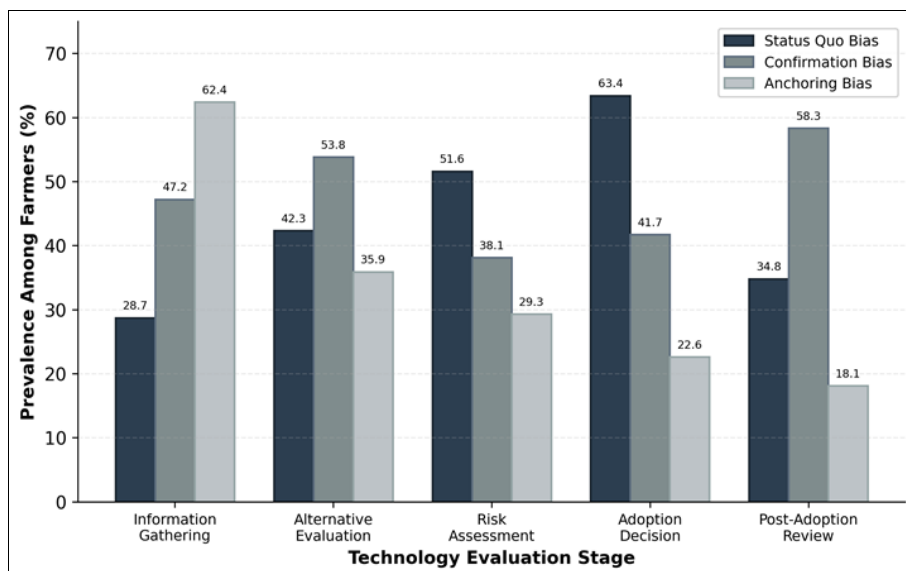


**Fig 1:** Comparison of cognitive bias prevalence across five technology evaluation stages

The grouped bar chart shows the shifting dominance of different biases through the evaluation process. Anchoring bias starts high and declines, status quo bias rises toward the

decision point, and confirmation bias peaks at both the evaluation and post-adoption stages, creating a U-shaped pattern.

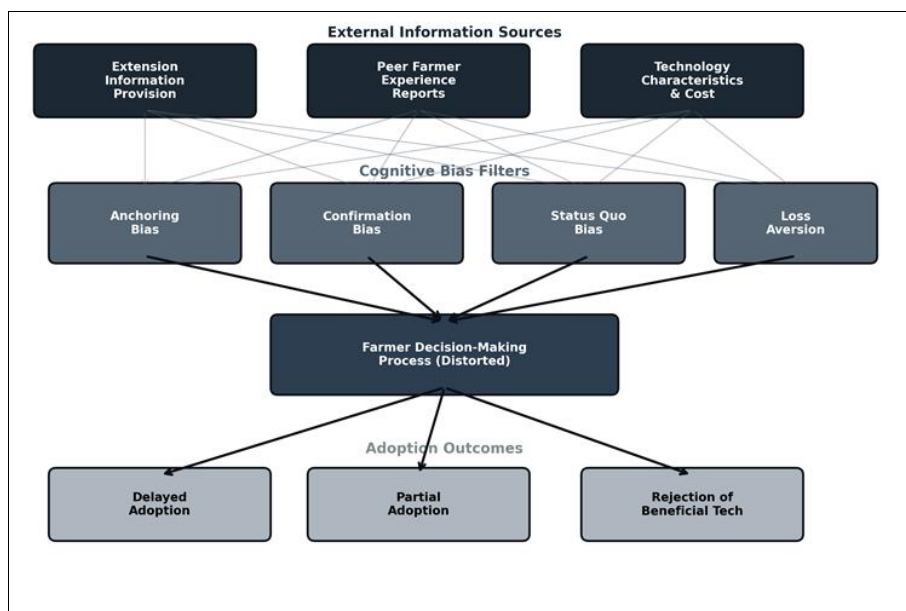


**Fig 2:** Conceptual model of cognitive bias influence on farmer technology adoption decisions

The model traces how external information from extension, peers, and technology sources passes through cognitive bias filters before entering the farmer's distorted decision-making process. The filtered process leads to three potential outcomes: delayed adoption, partial adoption, or outright rejection of beneficial technologies.

### Discussion

The stage-specific patterns of bias prevalence are both intuitive and practically informative. Anchoring bias peaks when farmers first encounter technology information, consistent with Tversky and Kahneman's (1974) <sup>[5]</sup> finding that initial information disproportionately shapes subsequent judgement. For extension, this means that the way a technology is first presented, what features are emphasised,

what comparison point is offered, may matter as much as the technology's actual merits. A first impression of high cost, for instance, may anchor evaluation even when later information reveals favourable benefit-cost ratios.

Status quo bias peaking at the adoption decision point (63.4%) confirms what many extension officers experience anecdotally: farmers who express interest during training sessions often revert to existing practices when the moment of actual change arrives <sup>[13]</sup>. The psychological weight of potential losses from switching appears to dominate at the decision threshold, even when farmers intellectually acknowledge the benefits of the new technology.

The negative correlation between extension contact and bias susceptibility ( $r = -0.47$ ) offers a hopeful finding. Regular exposure to extension information appears to provide

farmers with the cognitive tools, or at least the alternative reference points, needed to counteract systematic biases. This may explain why intensive extension approaches like farmer field schools, which provide repeated, hands-on exposure, consistently outperform one-off training sessions in adoption rates<sup>[14]</sup>.

### Limitations

Scenario-based vignettes measure bias susceptibility in hypothetical situations, which may not perfectly predict real-world decision behaviour. The cross-sectional design cannot establish whether extension contact reduces bias or whether less-biased farmers seek more extension contact. The sample was limited to two provinces in western DR Congo, and bias patterns may differ in regions with different agricultural systems and cultural norms. The three biases examined represent only a portion of the cognitive biases potentially relevant to technology evaluation; future research should consider availability bias, sunk cost effects, and social proof dynamics.

### Conclusion

This research reveals that cognitive biases operate in predictable, stage-specific patterns during farmer technology evaluation. Anchoring bias shapes initial impressions, confirmation bias filters ongoing evidence, and status quo bias resists change at the decision point. These patterns suggest that technology rejection is not always a rational response to poor fit but may partly reflect systematic distortions in how farmers process information. The negative association between extension contact and bias susceptibility points toward a practical solution: more frequent and deliberate extension engagement can help farmers develop the cognitive flexibility needed for sound technology evaluation. Extension programs that understand these bias patterns can design interventions accordingly, offering balanced initial presentations to counter anchoring, exposing farmers to disconfirming evidence to counter confirmation bias, and providing trial opportunities to reduce the perceived risk that feeds status quo bias.

### References

1. Kahneman D, Tversky A. Prospect theory: An analysis of decision under risk. *Econometrica*. 1979;47(2):263-291.
2. Feder G, Just RE, Zilberman D. Adoption of agricultural innovations in developing countries: A survey. *Econ Dev Cult Change*. 1985;33(2):255-298.
3. Foster AD, Rosenzweig MR. Microeconomics of technology adoption. *Annu Rev Econ*. 2010;2:395-424.
4. Tversky A, Kahneman D. Judgment under uncertainty: Heuristics and biases. *Science*. 1974;185(4157):1124-1131.
5. Kahneman D. *Thinking, fast and slow*. New York: Farrar, Straus and Giroux; 2011. p. 1-499.
6. Ragasa C, Lambrecht I, Kuber DS. Gaps in agricultural extension in the Democratic Republic of Congo: Evidence from nationally representative data. *Glob Food Sec*. 2022;33:100626.
7. Duflo E, Kremer M, Robinson J. Nudging farmers to use fertilizer: Theory and experimental evidence from Kenya. *Am Econ Rev*. 2011;101(6):2350-2390.
8. Kahneman D. Maps of bounded rationality: Psychology for behavioral economics. *Am Econ Rev*. 2003;93(5):1449-1475.
9. Samuelson W, Zeckhauser R. Status quo bias in decision making. *J Risk Uncertain*. 1988;1(1):7-59.
10. Tavakol M, Dennick R. Making sense of Cronbach's alpha. *Int J Med Educ*. 2011;2:53-55.
11. Pallant J. *SPSS survival manual*. 7th ed. London: Open University Press; 2020. p. 1-378.
12. Hair JF, Black WC, Babin BJ, Anderson RE. *Multivariate data analysis*. 8th ed. Boston: Cengage Learning; 2019. p. 1-813.
13. Suri T. Selection and comparative advantage in technology adoption. *Econometrica*. 2011;79(1):159-209.
14. Davis K, Nkonya E, Kato E, Mekonnen DA. Impact of farmer field schools on agricultural productivity and poverty in East Africa. *World Dev*. 2012;40(2):402-413.