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Knowledge, Attitude, and Practice on Resource Efficiency Management Among Wet Market Stallholders in Central Aurora, Philippines: The Mediating Role of Attitude

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Abstract *— Public wet markets depend daily on water, electricity, ice, and packaging, yet little is known about how Philippine stallholders manage these resources or how their knowledge becomes practice. Guided by the Knowledge-Attitude-Practice model, the Theory of Planned Behavior, and sustainability accounting, this descriptive-correlational study examined the knowledge, attitude, and practice of resource efficiency management among 163 stallholders selected by proportionate stratified random sampling from the public markets of Baler, Maria Aurora, Dipaculao, and San Luis in Aurora province, and tested whether attitude mediated the knowledge–practice relationship. Knowledge was generally good but uneven: 46.01% had high overall knowledge and 53.99% were at low or moderate levels, with packaging the weakest domain. Attitude was highly favorable (M = 3.33 of 4), highest for perceived benefits and lowest for self-efficacy, and resource-efficient practices were performed often (M = 3.02), most consistently for ice management and least for water use. About half of the stallholders kept receipts for ice or electricity, while 65.03% were willing to keep simple resource records if given a template. Knowledge predicted attitude (a = 0.019, p < .001), attitude predicted practice (b = 0.418, p < .001), and the indirect effect was significant (ab = 0.008, p = .002), accounting for 23.53% of the total effect; because the direct effect remained significant, attitude partially mediated the relationship. A Resource Management Framework that links knowledge building, attitude reinforcement, practical routines, simple resource-cost recording, and supportive local government interventions is proposed.*

Keywords *— **resource efficiency management, wet market stallholders, knowledge-attitude-practice, mediation analysis, sustainability accounting, Philippines***

I. INTRODUCTION

Public wet markets, or *palengke*, remain the primary trading centers of Philippine towns and cities, and the National Market Code (Republic Act No. 6039) and the Local Government Code (Republic Act No. 7160) place their regulation with local government units (LGUs). Most wet market enterprises are small, long-standing single proprietorships capitalized from personal savings; in Iloilo City, most vendors had operated for more than nine years, earned modest daily sales, and kept only manual accounting records (Carmen et al., 2020). Their daily operations use water for washing and sanitation, electricity for lighting and refrigeration, ice for preserving perishable goods, and packaging for wrapping and carrying products. These resources are costs to the stallholder and pressures on municipal water, energy, and waste systems.

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The Philippine policy framework for these resources is extensive but unevenly implemented. The Ecological Solid Waste Management Act (Republic Act No. 9003) assigned waste management mainly to LGUs, a transfer that Domingo and Manejar (2021) described as overly simplistic and that has produced weak policy foundations over two decades. In Cebu City barangays, compliance with most solid waste policies, including segregation, composting, and recycling, remained low (Camarillo & Bellotindos, 2021). Filipinos used an estimated 48 million shopping bags and 45 million thin-film bags in 2019, and only about 489 of 1,634 LGUs had ordinances regulating plastic bags and polystyrene (World Bank, 2024). Energy use in Philippine public markets is also high relative to what better design and operation could achieve (Manegdeg et al., 2019).

Behavioral research shows that knowledge does not translate automatically into practice. In Butuan City, households scored very high on solid waste knowledge and attitude, but knowledge of materials recovery facilities was low and practices such as composting remained incomplete (Cando et al., 2022). The Knowledge-Attitude-Practice (KAP) model and the Theory of Planned Behavior (TPB) suggest that attitude carries the effect of knowledge into behavior (Ajzen, 1991; Salas-Zapata et al., 2018), and environmental attitude has been found to mediate the effect of environmental knowledge on pro-environmental behavior (Liu et al., 2020). Philippine studies of market vendors, however, have focused on economic challenges (Bermas et al., 2023), empowerment (Langbid-Roda & Collantes, 2024), and solid waste knowledge (Galvez, 2017), not on resource efficiency across water, energy, ice, and packaging, and none has tested how vendors' knowledge becomes practice. Recordkeeping is a further gap: most rural micro-enterprises rely on memory rather than records (Malinao, 2026), which limits their ability to see the cost of resource use.

This study therefore examined resource efficiency management among wet market stallholders in Central Aurora, a fifth-class, predominantly agricultural province in Central Luzon with developing municipal environmental infrastructure (Municipality of Maria Aurora, 2015). Specifically, it determined the stallholders' levels of knowledge, attitude, and practice of resource efficiency management in terms of water use, energy consumption, ice management, and packaging materials; described their informal sustainability accounting practices; tested whether attitude mediated the relationship between knowledge and practice; and proposed a Resource Management Framework for stallholders and LGUs. Three null hypotheses were tested at the .05 level: knowledge does not significantly predict attitude ($H_0$1), attitude does not significantly predict practice ($H_0$2), and attitude does not significantly mediate the knowledge–practice relationship ($H_0$3).

II. LITERATURE REVIEW

Theoretical Framework

The study drew on three complementary frameworks. The KAP model holds that knowledge shapes attitude, which in turn shapes practice (Salas-Zapata et al., 2018). The TPB specifies the components of attitude that lead to behavior: evaluation of the behavior, perceived social expectations, and perceived behavioral control (Ajzen, 1991; Bosnjak et al., 2020). Attitude was therefore measured through three TPB-aligned dimensions: perceived benefits, willingness to adopt, and self-efficacy, the last reflecting the confidence that Bandura (1997) linked to the initiation and persistence of behavior. Sustainability accounting, which treats resource use as a measurable economic and environmental indicator (Hsiao et al., 2022; Lamberton, 2005), served as the overarching lens: it explains why water, electricity, ice, and packaging matter as costs and why stallholders' informal tracking of these costs was examined. Following the mediation logic of Baron and Kenny (1986) and Hayes (2013), knowledge was treated as the independent variable, attitude as the mediator, and practice as the dependent variable.

Knowledge, Attitude, and Resource-Efficient Practice

Small enterprises often recognize the value of environmental practices but adopt them unevenly. Internal capabilities encourage the adoption of environmental management practices by SMEs, whereas limited resources, knowledge, and support hold it back (Dasanayaka et al., 2022; Durrani et al., 2024). External support lowers knowledge barriers and increases the benefits SMEs gain from resource-efficiency practices (Bodas-Freitas & Corrocher, 2019), and sustainability tools for small firms work best when simplified to fit their limited resources and skills

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(Johnson & Schaltegger, 2016). Pro-environmental attitudes turn into behavior more readily when costs are low and benefits are visible (Wyss et al., 2022), and environmental knowledge affects pro-environmental behavior both directly and through attitudes and intentions (Liu et al., 2020; Mago et al., 2025). In the Philippines, households with strong waste knowledge still showed gaps in using recovery facilities (Cando et al., 2022), and barangay residents complied poorly with most waste policies (Camarillo & Bellotindos, 2021), which suggests that knowledge alone is not sufficient.

Sustainability Accounting and Informal Recordkeeping

Environmental management accounting links physical and monetary information on resource use to decisions (Burritt et al., 2019). Its adoption among Philippine SMEs is constrained mainly by the lack of regulatory frameworks, weak government assistance, and insufficient sustainability infrastructure (Binaluyo, 2024). Informal micro-enterprises face a more basic barrier: in rural Bohol, 14 of 18 micro-enterprises kept no formal records and relied on memory and verbal recall (Malinao, 2026), and most Iloilo City wet market vendors kept only manual records and prepared no financial reports (Carmen et al., 2020). Sustainability accounting among wet market stallholders must therefore be examined at the level of informal practice, such as keeping receipts, estimating weekly resource costs, and comparing them over time.

III. METHODOLOGY

Research Design

A quantitative, non-experimental, cross-sectional descriptive-correlational design with mediation analysis was used. The descriptive component determined the levels of knowledge, attitude, practice, and informal sustainability accounting; the mediation component tested whether attitude carried part of the effect of knowledge on practice (Hayes, 2013).

Locale, Population, and Sampling

The study was conducted in the public wet markets of the four Central Aurora municipalities: Baler, Maria Aurora, Dipaculao, and San Luis. The population was the 280 stallholders listed in the municipal records of wet market stallholders. Eligible respondents operated or managed a stall in one of these markets, were directly involved in daily stall operations, had at least six months of continuous experience, and gave informed consent. The sample size computed with the Raosoft calculator (5% margin of error, 95% confidence level, 50% response distribution) was 163, allocated proportionately across the municipal strata (Table 1), and respondents were drawn by simple random sampling from each municipal list.

Table 1: Population and Sample of Wet Market Stallholders by Municipality

Municipality	Population (*N*)	Sample (*n*)
Baler	102	59
Maria Aurora	79	46
Dipaculao	51	30
San Luis	48	28
Total	280	163

Note. Population figures are from the municipal records of wet market stallholders.

Of the 163 respondents, 95 (58.28%) were female, 91 (55.83%) sold plant-based products (PBP; produce), and 72 (44.17%) sold animal-based products (ABP; seafood and meat). Most were 41–50 (30.06%) or 51–60 years old (26.99%), had high school education (53.99%), and reported average daily sales of PHP 1,000–2,999 (55.21%). The largest groups had been in business for 20 years or more (25.77%) or 10–14 years (23.93%), and half (50.31%) operated their stalls alone.

Instrument

A researcher-made questionnaire adapted from KAP survey guidelines (Kaliyaperumal, 2004; Marías & Glasauer, 2014) had five parts. Part I gathered the profile. Part II measured knowledge with 24 true-or-false items requiring applied reasoning, six per domain (water use, energy consumption, ice management, and packaging materials), scored 1 for a correct answer and 0 for an incorrect or "I don't know" answer; levels were classified as low (< 50% correct), moderate (50–74%), and high (≥ 75%). Part III measured attitude with 18 items on a 4-point agreement scale, six each for perceived benefits, willingness to adopt, and self-efficacy. Part IV measured practice with 24 items on a 4-point frequency scale (1 = *never* to 4 = *always*), six per domain. Means were interpreted as 1.00–1.75 (*strongly disagree/never*), 1.76–2.50 (*disagree/rarely*), 2.51–3.25

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(*agree/often*), and 3.26–4.00 (*strongly agree/always*). Part V contained six yes-or-no items on informal sustainability accounting, such as keeping receipts for ice or electricity and comparing resource costs over time.

The instruments underwent validation from the seven (7) experts in business management and supervisors coming from the local government units who supervise the wet market, with five (5) of them are doctorate degree holder. Pilot testing was also concluded to establish the internal consistency of the questionnaires surpassing the threshold for both Cronbach alpha and KR Formula 20.

Data Collection

After panel approval and ethics endorsement, the questionnaire was administered face to face at the respondents' stalls, with the researcher or trained data collectors explaining the study, obtaining informed consent, and clarifying items in English or Filipino. Incomplete questionnaires were replaced with respondents drawn from the same municipal stratum.

Data Analysis

Knowledge levels were described with frequencies and percentages, computed within each stall type. Attitude and practice were described with means and standard deviations by dimension, domain, and item, and informal sustainability accounting with frequencies and percentages. Mediation was tested with knowledge (total correct answers) as the predictor, attitude (overall mean) as the mediator, and practice (overall mean) as the outcome, estimating paths *a*, *b*, and *c′* and the indirect effect *ab* (Baron & Kenny, 1986; Hayes, 2013; Preacher & Hayes, 2004).

The mediation model was estimated in jamovi using the medmod module. Knowledge was entered as the total number of correct answers on the 24-item knowledge test (possible range 0–24). Attitude and practice were entered as overall mean scores on their 4-point scales. Paths a, b, and c′ and the indirect effect (a × b) were estimated with standard errors computed by the delta method, which is the module's default, and each effect was tested with a z statistic at the .05 level of significance. Before the mediation analysis, zero-order correlations among knowledge, attitude, and practice were computed to establish the relationships among the three variables.

Ethical Considerations

Participation was voluntary, and respondents were informed that they could decline any item or withdraw without any effect on their standing in the market. Responses were recorded under anonymized identifiers, stored securely, and reported in aggregate in accordance with the Data Privacy Act of 2012 (Republic Act No. 10173).

IV. RESULTS AND DISCUSSION

Knowledge of Resource Efficiency Management

Table 2 shows that knowledge was generally good but uneven. High knowledge was the largest category overall (46.01%) and in every domain, but 53.99% of stallholders were at low or moderate levels. The proportion with high knowledge was greatest for water use (48.47%) and energy consumption (47.24%) and smallest for packaging materials (41.72%), which also had the largest low-knowledge group (27.61%). Within each stall type, PBP stallholders were more often in the high-knowledge category overall (50.55%) than ABP stallholders (40.28%), and the gap was largest for energy consumption (50.55% vs. 43.06%), whereas ABP stallholders were slightly more often highly knowledgeable about packaging (43.06% vs. 40.66%).

Table 2: Level of Knowledge of Resource Efficiency Management by Stall Type

Domain and level	ABP *f*	ABP %	PBP *f*	PBP %	All *f*	All %
Overall						
Low (< 50%)	20	27.78	17	18.68	37	22.70
Moderate (50–74%)	23	31.94	28	30.77	51	31.29
High (≥ 75%)	29	40.28	46	50.55	75	46.01
Water use						
Low (< 50%)	16	22.22	18	19.78	34	20.86

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Domain and level	ABP *f*	ABP %	PBP *f*	PBP %	All *f*	All %
Moderate (50–74%)	23	31.94	27	29.67	50	30.67
High (≥ 75%)	33	45.83	46	50.55	79	48.47
Energy consumption						
Low (< 50%)	16	22.22	14	15.38	30	18.40
Moderate (50–74%)	25	34.72	31	34.07	56	34.36
High (≥ 75%)	31	43.06	46	50.55	77	47.24
Ice management						
Low (< 50%)	21	29.17	16	17.58	37	22.70
Moderate (50–74%)	19	26.39	32	35.16	51	31.29
High (≥ 75%)	32	44.44	43	47.25	75	46.01
Packaging materials						
Low (< 50%)	19	26.39	26	28.57	45	27.61
Moderate (50–74%)	22	30.56	28	30.77	50	30.67
High (≥ 75%)	31	43.06	37	40.66	68	41.72

Note. ABP = animal-based product stallholders (n = 72); PBP = plant-based product stallholders (n = 91); all (N = 163). Percentages are computed within each group. Six items per domain; overall = 24 items.

The pattern agrees with Philippine evidence that knowledge of waste and resource practices is often substantial but incomplete. Cando et al. (2022) found very high solid waste knowledge among Butuan City households alongside low knowledge of recovery facilities, and public market vendors in Dancalan showed moderate to high knowledge of solid waste management (Galvez, 2017). The relatively strong water and energy knowledge likely reflects stallholders' daily experience with washing, cleaning, and refrigeration, whereas packaging items required judgment about material choice, disposal, and long-term costs that daily routine does not teach. The weakness in packaging knowledge matters because plastic bags and thin films remain heavily used in the Philippines and fewer than a third of LGUs regulate them (World Bank, 2024). Because knowledge items required applied reasoning rather than general awareness, the results suggest that more than half of the stallholders need practical, domain-specific instruction rather than general environmental messages.

Attitude Toward Resource Efficiency Management

Attitude was highly favorable (M = 3.33, SD = 0.35, *strongly agree*) and nearly identical for ABP (M = 3.32) and PBP stallholders (M = 3.33; Table 3). Perceived benefits was the highest dimension (M = 3.39), followed by willingness to adopt (M = 3.31) and self-efficacy (M = 3.28). At the item level (Table 4), stallholders most strongly agreed that resource efficiency contributes to the long-term sustainability of their stall (M = 3.47) and improves profitability (M = 3.45), and least agreed that it benefits both business and environment (M = 3.30). Willingness was strongest for adjusting daily operations and following guidelines (both M = 3.41) and weakest for openness to learning new techniques (M = 3.12), which ABP stallholders rated lowest (M = 3.01). Within self-efficacy, stallholders were most confident that they could adjust their routines (M = 3.39) and least confident that they could solve problems related to resource wastage (M = 3.16).

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Table 3: Attitude and Practice of Resource Efficiency Management by Stall Type

Dimension or domain	ABP *M* (*SD*)	PBP *M* (*SD*)	All *M* (*SD*)	Interpretation
Attitude				
Perceived benefits	3.38 (0.34)	3.40 (0.39)	3.39 (0.37)	Strongly agree
Willingness to adopt	3.29 (0.34)	3.34 (0.42)	3.31 (0.39)	Strongly agree
Self-efficacy	3.30 (0.32)	3.26 (0.46)	3.28 (0.40)	Strongly agree
Overall attitude	3.32 (0.30)	3.33 (0.38)	3.33 (0.35)	Strongly agree
Practice				
Water use	3.00 (0.46)	2.97 (0.45)	2.99 (0.46)	Often
Energy consumption	3.05 (0.45)	2.99 (0.48)	3.02 (0.47)	Often
Ice management	3.11 (0.43)	3.01 (0.44)	3.05 (0.44)	Often
Packaging materials	3.01 (0.43)	3.00 (0.43)	3.01 (0.43)	Often
Overall practice	3.05 (0.40)	2.99 (0.41)	3.02 (0.40)	Often

Note. ABP n = 72; PBP n = 91. Scale: 1.00–1.75 strongly disagree/never; 1.76–2.50 disagree/rarely; 2.51–3.25 agree/often; 3.26–4.00 strongly agree/always.

Table 4: Item-Level Attitude Toward Resource Efficiency Management

Item	ABP *M*	PBP *M*	All *M* (*SD*)	Interpretation
Perceived benefits				
Practicing resource efficiency reduces operational costs.	3.43	3.35	3.39 (0.59)	SA
Resource-efficient practices reduce waste and environmental impact.	3.43	3.41	3.42 (0.60)	SA
Resource efficiency contributes to the long-term sustainability of my stall.	3.44	3.48	3.47 (0.56)	SA
Efficient use of resources helps improve my overall profitability.	3.47	3.44	3.45 (0.59)	SA
Resource efficiency enhances the cleanliness and organization of my stall.	3.32	3.35	3.34 (0.54)	SA
Resource efficiency benefits both my business and the environment.	3.21	3.37	3.30 (0.62)	SA
Willingness to adopt				
I am willing to implement practices to reduce waste.	3.39	3.35	3.37 (0.60)	SA
I am willing to adjust my daily operations to become more resource-efficient.	3.38	3.44	3.41 (0.57)	SA
I am willing to explore new methods or tools that improve resource efficiency.	3.36	3.36	3.36 (0.56)	SA
I am open to learning new techniques for better resource management.	3.01	3.21	3.12 (0.63)	A

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Item	ABP *M*	PBP *M*	All *M* (*SD*)	Interpretation
I am willing to invest time or effort to improve resource efficiency in my stall.	3.19	3.23	3.21 (0.64)	A
I am willing to follow guidelines or recommendations related to resource efficiency.	3.40	3.42	3.41 (0.60)	SA
Self-efficacy				
I am confident I can implement resource-efficient practices effectively in my stall.	3.35	3.26	3.30 (0.59)	SA
I can reduce resource wastage without negatively affecting my operations.	3.19	3.30	3.25 (0.63)	A
I can maintain resource-efficient practices consistently over time.	3.32	3.30	3.31 (0.59)	SA
I can easily adjust my routine to improve resource efficiency.	3.38	3.40	3.39 (0.58)	SA
I have the skills needed to manage resources efficiently in my stall.	3.32	3.22	3.26 (0.62)	SA
I am capable of solving problems related to resource wastage in my operations.	3.24	3.10	3.16 (0.65)	A

Note. SA = strongly agree; A = agree. Item wording is shortened in some rows.

These findings show a strong attitudinal foundation in which economic benefit is more salient than environmental benefit. Stallholders' emphasis on profitability and stall sustainability agrees with evidence that SMEs adopt environmental practices more readily when they see cost savings and long-term business value (Dey et al., 2020; Surbakti et al., 2025), and with Wyss et al.'s (2022) finding that attitudes turn into behavior when benefits are visible. The weaker openness to learning new techniques, especially among ABP stallholders, together with strong willingness to follow guidelines, suggests that stallholders prefer clear, prescribed routines to open-ended training, consistent with Johnson and Schaltegger's (2016) argument that sustainability tools for small firms must be simple and practical. The lower confidence in solving wastage problems is consistent with evidence that knowledge and support barriers limit small firms' environmental performance (Durrani et al., 2024) and that external advice helps SMEs overcome them (Bodas-Freitas & Corrocher, 2019). Because self-efficacy corresponds to perceived behavioral control in the TPB (Ajzen, 1991), it is the attitudinal dimension most likely to limit the translation of positive attitudes into practice.

Resource Efficiency Practices

Stallholders performed resource-efficient practices often (*M* = 3.02, *SD* = 0.40; Table 3). Ice management was the most consistently practiced domain (*M* = 3.05), particularly among ABP stallholders (*M* = 3.11), and water use was the least (*M* = 2.99). At the item level (Table 5), the most frequent practices were using only the water needed for daily operations (*M* = 3.23), minimizing refrigerator and freezer opening (*M* = 3.18), and avoiding excessive packaging (*M* = 3.12). The least frequent were encouraging customers to use reusable containers or bags (*M* = 2.76), avoiding excessive water use during cleaning (*M* = 2.77), planning ice use on daily needs (*M* = 2.91), turning off taps immediately (*M* = 2.91), and using energy-efficient lighting or equipment (*M* = 2.93). No practice reached the *always* level.

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Table 5: Item-Level Resource Efficiency Practices

Item	ABP *M*	PBP *M*	All *M* (*SD*)
Water use			
I turn off taps immediately after use.	2.96	2.87	2.91 (0.71)
I use buckets or containers instead of running water when cleaning.	3.10	3.11	3.10 (0.63)
I reuse water when possible.	3.03	2.97	2.99 (0.72)
I avoid excessive use of water during cleaning.	2.76	2.77	2.77 (0.65)
I check for and address water leaks in my stall.	2.93	2.91	2.92 (0.68)
I use only the amount of water necessary for daily operations.	3.25	3.21	3.23 (0.62)
Energy consumption			
I switch off lights and appliances when not in use.	3.06	2.96	3.00 (0.70)
I maintain refrigerators and freezers for optimal energy use.	2.99	2.92	2.95 (0.74)
I use energy-efficient lighting or equipment whenever possible.	2.90	2.96	2.93 (0.66)
I minimize frequent opening of refrigerators or freezers.	3.22	3.14	3.18 (0.67)
I avoid overloading electrical outlets or equipment.	3.04	3.05	3.05 (0.66)
I monitor my electricity use to reduce unnecessary consumption.	3.11	2.93	3.01 (0.70)
Ice management			
I use only the amount of ice necessary for preservation.	3.14	2.98	3.05 (0.69)
I store ice in covered containers to minimize melting.	3.11	3.03	3.07 (0.68)
I regularly monitor ice usage to prevent wastage.	3.10	3.04	3.07 (0.66)
I plan my ice usage based on daily needs.	2.99	2.86	2.91 (0.71)
I minimize exposure of ice to heat or sunlight.	3.22	3.02	3.11 (0.66)
I properly manage melted ice to avoid waste and mess.	3.13	3.10	3.11 (0.63)
Packaging materials			
I minimize the use of single-use plastics or other packaging.	3.06	3.01	3.03 (0.63)
I reuse packaging materials whenever possible.	3.04	3.02	3.03 (0.63)
I properly dispose of or recycle packaging waste.	2.97	3.02	3.00 (0.65)
I encourage customers to use reusable containers or bags.	2.76	2.76	2.76 (0.69)
I avoid excessive packaging of products.	3.18	3.08	3.12 (0.66)
I select packaging materials that reduce waste when possible.	3.06	3.11	3.09 (0.64)

Note. All item means fall within 2.51–3.25 (*often*). ABP n = 72; PBP n = 91.

The practice profile suggests that stallholders conserve resources most consistently when conservation protects their goods. Ice management, which directly affects product quality and spoilage,

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was the strongest domain, consistent with the role of temperature control in preventing food loss and ensuring safety (Food and Agriculture Organization of the United Nations [FAO], 2019; Wu & Hsiao, 2021), and minimizing refrigerator opening was the most frequent energy practice. Water conservation was weaker because cleaning and sanitation require water and stallholders may see generous washing as a safeguard of hygiene; the low frequency of avoiding excessive water during cleaning echoes the concern for both cleanliness and limited water supply in wet markets (Mekonnen & Gerbens-Leenes, 2020). Practices requiring investment or planning, such as using energy-efficient equipment and planning ice purchases, were less frequent, consistent with the economic and informational barriers to SME energy-efficiency adoption (Dasanayaka et al., 2022). The least frequent practice, encouraging customers to bring reusable bags, depends on customers as well as stallholders and on local regulation, which remains uneven across Philippine LGUs (World Bank, 2024); reusable packaging systems also require behavior change on both sides of the transaction (Coelho et al., 2020; Rabiu & Jaeger-Erben, 2024).

Informal Sustainability Accounting

Table 6 shows that informal sustainability accounting was limited. About half of the stallholders kept receipts or records for ice (49.08%) or electricity (50.31%) and compared resource spending over time (49.69%), and 56.44% had a rough estimate of their weekly resource costs. Willingness was higher: 61.35% believed that tracking resource expenses would help them manage their stalls, and 65.03% would keep simple records if given a template. Within stall types, PBP stallholders more often compared spending over time (54.95%) than ABP stallholders (43.06%), and ABP stallholders were the most willing of all groups to keep simple records (68.06%).

Table 6: Informal Sustainability Accounting Practices by Stall Type

Statement	ABP *f*	ABP %	PBP *f*	PBP %	All *f*	All %
I keep receipts or records of what I spend on ice.	37	51.39	43	47.25	80	49.08
I keep receipts or records of what I spend on electricity.	38	52.78	44	48.35	82	50.31
I have a rough estimate of my weekly spending on water, ice, electricity, or packaging.	41	56.94	51	56.04	92	56.44
I compare my resource spending from week to week or month to month.	31	43.06	50	54.95	81	49.69
Tracking my resource-related expenses would help me manage my stall better.	43	59.72	57	62.64	100	61.35
I would keep simple records of my resource use if given a simple tool or template.	49	68.06	57	62.64	106	65.03

Note. Frequencies are "yes" responses. Percentages are computed within each group (ABP n = 72; PBP n = 91; all N = 163).

The gap between willingness and current recording agrees with Philippine evidence on informal enterprises. Most rural Bohol micro-enterprises relied on memory rather than records (Malinao, 2026), and most Iloilo City wet market vendors kept only manual records without financial reports (Carmen et al., 2020). Without records, stallholders cannot see how much water, electricity, ice, or packaging they waste, which limits the feedback that environmental management accounting is meant to provide for decisions (Burritt et al., 2019). The strong willingness to use a simple template supports Johnson and Schaltegger's (2016) recommendation that sustainability tools for small firms be simplified, and the barriers identified among Philippine SMEs, namely weak government

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assistance and infrastructure (Binaluyo, 2024), point to a role for LGUs in providing such tools.

Mediating Role of Attitude

Knowledge significantly predicted attitude (a = 0.019, SE = 0.005, z = 3.93, p < .001), and attitude significantly predicted practice while controlling for knowledge (b = 0.418, SE = 0.080, z = 5.23, p < .001; Table 7). The indirect effect of knowledge on practice through attitude was significant (ab = 0.008, SE = 0.003, z = 3.14, p = .002) and accounted for 23.53% of the total effect (c = 0.034, p < .001). The direct effect remained significant (c' = 0.026, SE = 0.005, z = 4.86, p < .001), indicating partial mediation (Figure 1). $H_0$1, $H_0$2, and $H_0$3 were therefore rejected.

Table 7: Mediation Analysis of Attitude in the Relationship Between Knowledge and Practice

Path or effect	Estimate	*SE*	*z*	*p*	% of total
Knowledge → Attitude (*a*)	0.019	0.005	3.932	< .001	–
Attitude → Practice (*b*)	0.418	0.080	5.233	< .001	–
Indirect effect (*a* × *b*)	0.008	0.003	3.143	.002	23.53
Direct effect (*c'*)	0.026	0.005	4.863	< .001	76.47
Total effect (*c*)	0.034	0.005	6.200	< .001	100.00

Note. N = 163. Unstandardized estimates. Knowledge = total correct answers; attitude and practice = overall means on 4-point scales.

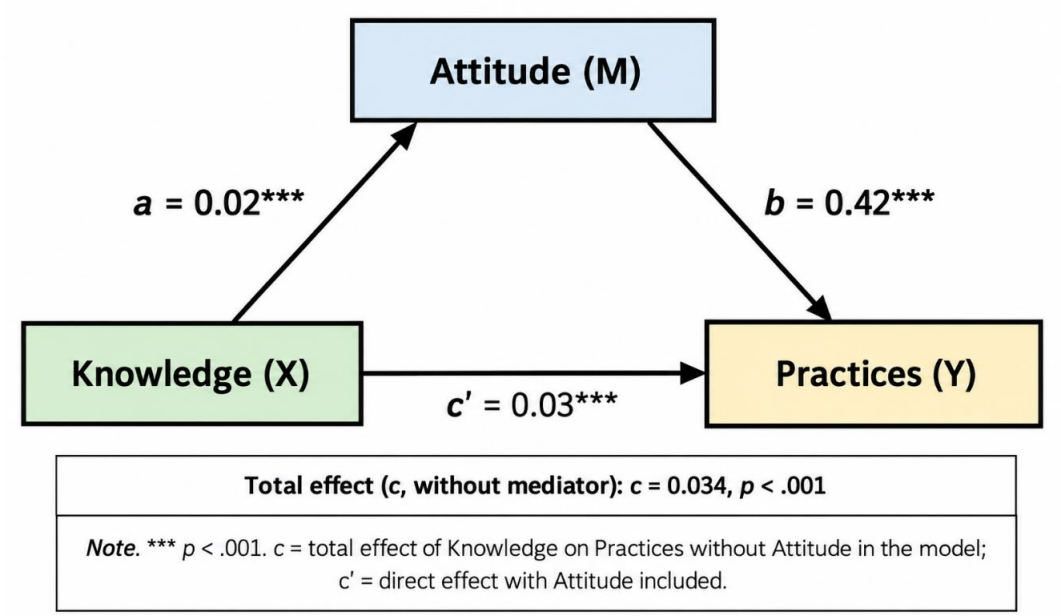


Fig.1: Path Diagram of the Mediation Model

The results support the KAP sequence in its mediation form: knowledge strengthened stallholders' appreciation of, willingness for, and confidence in resource efficiency, and these attitudes in turn were associated with more frequent resource-efficient practice. This agrees with Liu et al. (2020), who found that environmental attitudes mediated the effect of environmental knowledge on pro-environmental behavior, and with Singh et al. (2026) and Mago et al. (2025), who found both direct and indirect effects of environmental knowledge on behavior. The largest path was from attitude to practice, which is consistent with the TPB view that evaluation, intention, and perceived control are the proximal determinants of behavior (Ajzen, 1991; Bosnjak et al., 2020) and with evidence that psychosocial factors drive pro-environmental intentions and practices (Konalingam et al., 2024).

The mediation was partial, and more than three quarters of the effect of knowledge on practice was direct. For stallholders, much of what they know about resource efficiency, such as covering ice or

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limiting refrigerator opening, can be applied directly once known, without first changing attitudes. At the same time, the significant indirect path shows that knowledge campaigns are more effective when they also build perceived benefits and confidence. Because attitudes were already highly favorable with limited variation, the room for attitude to carry further change may be narrower than the room for practical knowledge and skill. These findings imply that interventions should combine domain-specific instruction with demonstrations that build self-efficacy, rather than relying on awareness messages alone. Because the design was cross-sectional, the paths describe statistical associations and not causal effects.

Proposed Resource Management Framework

Figure 2 presents the Resource Management Framework derived from the findings, and Table 8 summarizes its main components. The framework places knowledge, attitude, and practice at its center, following the partial mediation result, and surrounds them with two supports: sustainability accounting and monitoring through simple resource logbooks, and an enabling environment provided by LGUs through ordinances, infrastructure, education and technical assistance, incentives, and monitoring. Stallholder actions and LGU interventions are specified for each area, and the cycle closes through regular review of records for continuous improvement.

Table 8: Key Components of the Proposed Resource Management Plan

Area	Basis from the findings	Stallholder actions	LGU interventions
Knowledge enhancement	53.99% at low or moderate knowledge; packaging weakest	Join short practical training; display simple resource-saving guides in stalls	Resource-efficiency orientation at permit issuance or renewal; illustrated materials in Filipino
Attitude and self-efficacy	Strong benefits and willingness; lowest confidence in solving wastage problems (M = 3.16)	Set one weekly resource-saving goal; conduct a simple weekly stall check for leaks, ice loss, and excess packaging	Hands-on demonstrations and technical assistance; Green Stall recognition
Water use	Lowest practice domain (M = 2.99); excess water in cleaning (M = 2.77)	Clean with buckets, close taps, check leaks, reuse water only where hygienic	Maintain water points, repair leaks, issue water-use guidelines, consider low-flow fixtures
Energy and ice	Efficient equipment (M = 2.93) and daily ice planning (M = 2.91) least practiced	Maintain refrigerators, limit opening, estimate daily ice needs, use covered containers	Facilitate access to efficient lighting and refrigeration; hygienic ice-storage standards
Packaging	Encouraging reusable bags least practiced (M = 2.76)	Avoid excess packaging, reuse suitable materials, segregate waste, prompt customers to bring bags	Market-level segregation facilities; incentives for reusable or low-waste packaging
Sustainability accounting	49–50% keep receipts; 65.03% willing to use a template	Keep a weekly resource logbook of water, electricity, ice, and packaging costs; compare monthly	Distribute a one-page resource monitoring form with record-keeping orientation
Institutionalization	Partial mediation: knowledge and attitude both matter	Comply with market resource-efficiency policies and join LGU programs	Integrate resource-efficiency indicators into ordinances, permits, and inspections, with feedback rather than penalties alone

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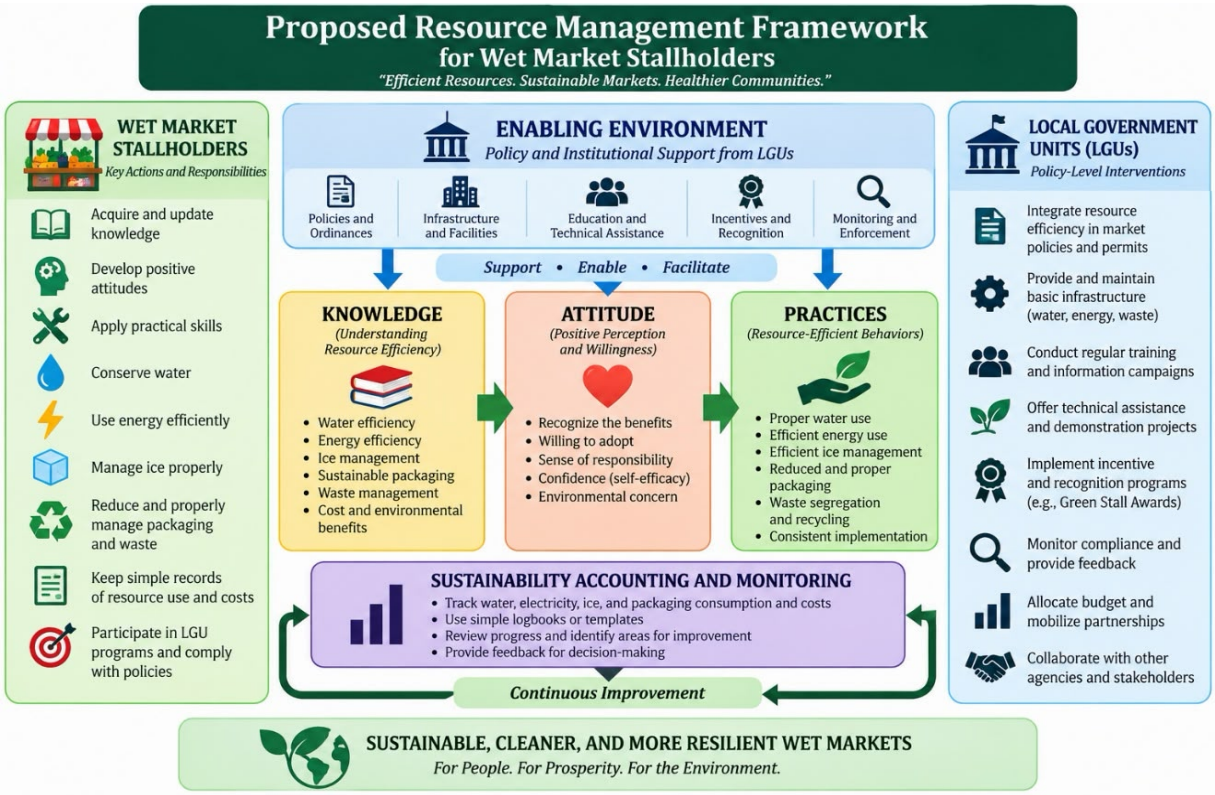


Fig.2: Proposed Resource Management Framework for Wet Market Stallholders

Limitations

The study covered public markets in four municipalities of one province and relied on self-reported practices, which may overstate actual behavior. Stallholders' resource use and costs were not measured directly. ABP and PBP stallholders were compared descriptively, without inferential tests. The cross-sectional design does not establish causal direction among knowledge, attitude, and practice, and other factors, such as market infrastructure, customer demand, and LGU support, were not modeled.

V. CONCLUSIONS AND RECOMMENDATIONS

Wet market stallholders in Central Aurora had generally good but uneven knowledge of resource efficiency management, with more than half below the high-knowledge level and packaging the weakest domain. Their attitudes were highly favorable, driven more by economic than environmental benefits, with lower openness to learning new techniques and lower confidence in solving wastage problems. They practiced resource efficiency often but not always, most consistently in ice management and least in water use, and few systematically recorded resource costs, although most were willing to do so with a simple template. Attitude partially mediated the relationship between knowledge and practice, so improving practice requires both practical knowledge and stronger perceived benefits and self-efficacy. The proposed Resource Management Framework links these findings to stallholder routines, simple resource accounting, and LGU support.

Stallholders may adopt simple daily routines for each resource, such as cleaning with buckets, closing taps, limiting refrigerator opening, planning daily ice needs, and avoiding excess packaging, and may keep a weekly resource logbook to compare costs over time. Market administrators and the LGUs of Baler, Maria Aurora, Dipaculao, and San Luis may integrate a short, practical resource-efficiency orientation into permit issuance and renewal, using illustrated materials in Filipino; provide hands-on demonstrations on detecting leaks, ice loss, and inefficient equipment to build stallholders' self-efficacy; maintain market water points and repair leaks; strengthen market-level waste segregation and

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incentives for reusable bags in line with local plastic regulation; distribute a one-page resource monitoring template; and recognize resource-efficient stalls through a Green Stall award. Future researchers may test the framework through intervention studies, measure actual resource use and costs, compare ABP and PBP stallholders with inferential tests, extend the study to other provinces, and include market infrastructure, customer behavior, and LGU support in the model.

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DECLARATION OF CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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