Perceived Importance of Industry Feedback in TVET Curriculum Development: An Ordered Logistic Regression Analysis of Sampled Nigerian TVET Lecturers

Korter Grace
Federal Polytechnic Offa, Nigeria
Corresponding Author Email: gracekorter@fedpoffaonline.edu.ng ALT kortergrace@gmail.com
Mobile: +2348055959496

Lawal Praise
Kwara State University, Malete, Nigeria
Email: praiselawal@yahoo.com

Obafemi Babatunde
Federal University Lokoja, Nigeria
Email: tunde.obafemi@fulokoja.edu.ng

King Korter
Federal University of Technology, Minna, Nigeria
Email: korterking00@gmail.com

Abstract

This study investigates the extent to which industrial engagement influences TVET lecturers' perceptions of the value of industry feedback in curriculum development. Drawing on data from a structured survey of 69 Nigerian TVET lecturers and employing an ordered logistic regression model, the analysis explores how two key engagement indicators any industry involvement (B1) and frequency of engagement (B3) affect the likelihood of rating industry feedback as important. The findings reveal a significant threshold effect: lecturers who have participated in any form of industrial engagement are more than four times as likely to value industry input as highly important (Odds Ratio = 4.18), while the frequency of engagement shows no statistically significant influence. These results underscore the transformative role of initial contact with industry, suggesting that a single, meaningful engagement can reshape educator attitudes and enhance the relevance of curriculum design. The study concludes with evidence-based policy recommendations, including mandating baseline engagement, institutionalizing feedback mechanisms, and embedding structured partnerships into accreditation and monitoring systems.

Keywords: TVET, industry feedback, curriculum development, industrial engagement, workforce readiness

Introduction

Technical and Vocational Education and Training (TVET) serves as the bridge between academic instruction and workplace demands, equipping learners with the practical skills,

technological know-how, and professional attitudes essential for national competitiveness. Yet, persistent reports of graduate unemployability and skill mismatches in Nigeria underscore a critical shortfall: curricula too often evolve in isolation from industry realities. Industry feedback defined as structured input from employers, trade associations, and technical experts on course content, teaching strategies, and assessment standards offers a vital mechanism for keeping TVET programs aligned with evolving occupational requirements and emerging technologies.

Despite broad consensus on the value of employer engagement, most studies to date rely on descriptive surveys or case studies (Nwoye, Ndubuisi, Omale, & Sukkuk, 2016; Akinola, Eze, Ali, Alfred, & Attah, 2020), leaving unresolved how specific engagement drivers influence educator perceptions of feedback importance. There is scant quantitative evidence on whether merely establishing contact with industry partners (the "threshold effect") or the frequency of interactions more powerfully shapes lecturers' willingness to incorporate employer counsel into curriculum review.

This study fills that gap by applying an ordered logistic regression framework to survey data from 69 Nigerian TVET lecturers. Its core objectives are to quantify the impact of any industrial engagement (B1) and engagement frequency (B3) on the odds that a lecturer will rate industry feedback as important (C3). Secondly, assess the statistical adequacy of the ordered logit model through diagnostics, ensuring robustness and coherence. Lastly, translate the findings into practical, evidence-based recommendations for institutional policy and practice aimed at deepening industry–academia collaboration.

By delivering replicable, data-driven insights into the attitudinal levers that drive curriculum responsiveness, this research contributes both to the empirical methodology of TVET studies and to the strategic policy discourse on quality assurance. It offers a clear, quantitative basis for designing interventions such as mandating a minimum engagement threshold or refining partnership metrics that maximize the value educators place on employer feedback.

Literature review

Industry feedback is the structured input of employers, professional associations, and technical experts has become fundamental to keeping Technical and Vocational Education and Training (TVET) curricula aligned with fast-evolving workplace demands. As UNESCO/ILO (2002) assert, closing the loop between classroom instruction and real-world expectations ensures that syllabi remain relevant by integrating emerging technologies, sector-specific safety norms, and current competency benchmarks.

Beyond formal panels and accreditation visits, mechanisms such as co-design workshops, guest lectures, and supervised work placements enable direct transmission of industry insights into teaching environments (UNESCO, 2004). Crucially, when feedback is approached not as a periodic audit but as a continuous stakeholder dialogue, institutions foster stronger graduate readiness (Egbri & Chukwuedo, 2013; Soares, 2010).

Drawing on Stakeholder Theory (Freeman, 1984), employers in this context are viewed as primary stakeholders whose legitimacy and influence should shape curriculum design and delivery. Their input represents more than optional commentary; it is an institutional imperative. However, many Nigerian TVET programs suffer from weak stakeholder mapping, where employer involvement is sporadic and treated as a checkbox exercise. This leads to curriculum misalignment and persistent skill gaps.

Recent literature (Onwusa, 2021; Nwoye et al., 2016; Eze & Okorafor, 2012) converges on four strategic pillars for embedding feedback sustainably:

- Mandating employer representation on curriculum committees and tying accreditation to documented feedback processes
- Establishing TVET-Industry Liaison Units to broker partnerships, manage MoUs, and track recommendation uptake
- Building faculty expertise in partnership management and co-design, supported by grants and secondment opportunities
- Adopting indigenous models tailored to local labour market dynamics

Yet, translating policy ambition into sustained practice requires more than structural reform, it demands behavioural change. Here, Rogers' Diffusion of Innovation Model (2003) offers a diagnostic lens:

Adoption stage	*TVET behavior*
Knowledge	Recognition of employer feedback as valuable
Persuasion	Faculty and administration acknowledge its utility
Decision	Creation of feedback interfaces (e.g., liaison units)
Implementation	Integration of recommendations into pedagogy and curriculum
Confirmation	Feedback-driven improvements reinforce continued engagement

Stalled progression between these stages caused by budget constraints, political instability, or low social prestige can derail otherwise promising initiatives (Akinola et al., 2020; Ugwoke et al., 2016). Although Akinola et al. (2020) outlines five operational modalities namely, joint research, industry-sponsored secondments, co-designed curricula, student placements, and shared assessment tools. Their contributions would benefit from further differentiation. Embedding these modalities into broader reform agendas, informed by change adoption thresholds and stakeholder reciprocity mechanisms, strengthens their strategic relevance.

Nigeria's TVET framework, rooted in colonial apprenticeships and unified under the NBTE (FRN, 2004; Onwusa, 2021), remains fragmented across secondary schools,

polytechnics, and universities. Experts argue for systemic reform grounded in feedback as a core institutional function not a peripheral add-on.

Ultimately, moving from episodic consultation to embedded, outcome-oriented feedback systems is critical. By institutionalizing stakeholder engagement and progressing it through targeted policy supports, faculty incentives, and indigenous adaptation, Nigerian TVET can become genuinely responsive to the competencies workplaces demand today.

Methods

Study design and variables

In this study, we sought to explore how industrial engagement relates to the effectiveness of TVET curriculum delivery. Respondents (TVET lecturers) provided ordinal responses to items that capture both industrial engagement and curriculum delivery practices. The industrial engagement measures include:

B1: "Are you currently involved in any industrial engagement activities?"

B3: "How often do you engage with industry partners?"

Curriculum delivery and industry relevance were measured by the following ordinal items:

C1: "How often do you incorporate industry relevant examples/case studies into your teaching?"

C2: "Do you involve partners in curriculum development review?"

C3: "How important is industry feedback in shaping your curriculum?"

Each response was recorded on a Likert-type scale (e.g., 1 = "Never" up to 5 = "Always" or "Not important" to "Very important"), which rendered the outcome variables inherently ordinal.

Instrumentation/measurement reliability

A self-developed questionnaire was used to collect data on TVET lecturers' perceptions of curriculum delivery and industrial engagement. The instrument was constructed based on an extensive review of relevant literature and was designed to capture key constructs using multiple items. To ensure content validity, the draft questionnaire was reviewed by five subject matter experts in the fields of TVET and industrial training. Their feedback was incorporated, resulting in a refined instrument that clearly defined each variable under investigation.

Prior to the full-scale survey, a pilot study was conducted with a small subset of the target population to assess the instrument's reliability. Cronbach's alpha was calculated to determine the internal consistency of the items. The pilot testing yielded a Cronbach's alpha coefficient of 0.83, which exceeds the generally accepted threshold of 0.70 for adequate reliability. This coefficient indicates that the items have strong internal consistency and that the instrument is a dependable measure of the constructs of interest. These reliability measures

support the decision to employ the survey tool in the main study despite the inherent challenges of data collection in our context.

Data collection and sample justification

While many of the studies in our field report surveys with larger sample sizes, it is not uncommon for research focusing on specific professional groups such as TVET lecturers, especially in contexts with infrastructural challenges (e.g., inconsistent internet access and frequent power outages) to yield relatively small sample sizes. Although, a direct comparison is challenging because many of the referenced studies do not explicitly report a sample size as low as 69, studies conducted in similar environments within Nigeria have encountered comparable limitations. For instance, research on TVET issues in resource-constrained contexts by authors such as Okwelle, Deebom, Harcourt, and Okwelle (2017) and Okoye and Okwelle (2013) sometimes reveals that accessing highly specific or hard-to-reach populations (e.g., TVET academic staff) can result in modest sample sizes. Similarly, several studies on technical and vocational education in Nigeria have noted challenges that naturally restrict the respondent pool e.g., (Akhuemonkhan & Raimi, 2013; Ojimba, 2012).

Moreover, given the documented challenges in the Nigerian context, such as unreliable Internet connectivity and erratic electricity supply (as highlighted in Achuama, 2024), a sample size of 69 is justifiable and does not automatically detract from the reliability of the findings. The internal consistency of our survey instrument (Cronbach's alpha = 0.83) and the focused nature of our target population (TVET lecturers) further support the validity of the results. Therefore, while our sample size might appear modest compared to surveys of broader populations, it is consistent with, and indeed a reflection of the real-world constraints encountered in similar studies conducted in Nigeria.

Statistical analysis

Given the ordinal nature of the response variables (C1, C2, and C3), we employed Ordered Logistic Regression (OLR), also known as the ordered logit model to evaluate the effect of industrial engagement on curriculum delivery practices. This model is particularly appropriate when the dependent variable is ordinal and when the proportional odds (or parallel lines) assumption is met.

For each curriculum indicator (e.g., C1, C2, or C3), the general specification for the ordered logistic regression model is as follows:

$$\text{logit}\,[P(Y \geq j)] = \alpha j - \beta_1 X_1 - \beta_2 X_2 \text{ for } j = 1,2,\ldots,J-1$$

where:

logit $[P(Y \geq j)]$: This is the log-odds of the probability that the outcome Y is at least category j. It transforms probabilities into a form suitable for linear modelling.

Y is the ordinal outcome variable (e.g., frequency of incorporating industry examples in teaching for C1).

j denotes the threshold between ordinal response categories.

αj represents the cutpoint (threshold parameter) for the jth category.

X_1 and X_2 are predictor variables representing industrial engagement strategies derived from responses to B1 and B3.

$\beta 1$ and β_2 are the coefficients that indicate the effect size of each predictor.

In this formulation, the model expresses the log odds that a respondent's score on a given curriculum delivery indicator is in a higher category versus all lower categories.

Assumptions and model diagnostics

Several rules and assumptions underpin the validity of the ordered logistic regression model:

1. Ordinality of the Outcome: The dependent variable must have a natural order. In our study, responses such as frequency of use or perceived importance are ordered by design.
2. Proportional Odds/Parallel Lines Assumption: The relationship between each pair of outcome groups is assumed to be consistent. This assumption implies that the coefficients that describe the relationship between predictor variables and the odds of being in a higher versus a lower category are the same regardless of the threshold. We tested this assumption by using procedures such as the Brant test.
3. No Perfect Multicollinearity: The independent variables (industrial engagement measures) should not be perfectly correlated. Prior to running the model, correlation analyses and diagnostics were conducted to ensure that multicollinearity was not an issue.
4. Adequate Sample Size: For reliable estimation, the sample size must be sufficient to support the number of predictors included in the model.
5. Interpretation via Odds Ratio: The coefficients (β) obtained from the model are exponentiated to yield odds ratios (OR). For example, an odds ratio greater than 1 indicates that a one-unit increase in the predictor variable is associated with higher odds of being in a higher category of the curriculum variable. Conversely, an odds ratio less than 1 indicates reduced odds.

Estimation and software

The ordered logistic regression analyses, along with the computation of corresponding odds ratios and confidence intervals, were performed using statistical software. Significance levels were set at $p < 0.05$, and model fit was assessed via pseudo-R^2 values and likelihood ratio tests.

By applying the ordered logistic regression model, this study quantitatively assessed how variations in industrial engagement (as measured by B1 and B3) influence key curricular practices (C1, C2, and C3). The use of odds ratios facilitates straightforward interpretation;

specifically, it allows for quantifying how likely it is that higher levels of industrial engagement are associated with more effective curriculum delivery practices.

Results and discussion

Descriptive statistics

The analysis sample comprised 69 TVET lecturers. The binary indicator of any industrial engagement (B1) had a prevalence of 56.5%, while frequency of engagement (B3) ranged from 1 ("never") to 6 ("very frequently"), with a mean of 3.58. The outcome variable perceived importance of industry feedback in shaping curriculum (C3) was measured on a 5-point ordinal scale, with a sample median of 5 ("very important") and a mean of 4.13.

Model specification and fit

An ordered logistic regression was fitted with C3 as the dependent variable and B1 and B3 as predictors. The logit-link model converged in five iterations, yielding a log-likelihood of –81.75 and an AIC of 175.50. Residual deviance (163.50) and the absence of convergence warnings indicate that the model provides an acceptable fit to the data, with no evidence of overdispersion or extreme instability.

Regression results

Table 1 summarizes the predictor coefficients and their odds-ratio transformations.

Table 1. Ordered logistic regression of C3 on B1 and B3

Predictor	Estimate	Std. Error	t-value	Odds Ratio (e^β)
B1	1.42915	0.5265	2.7145	4.18
B3	–0.07791	0.1144	–0.6812	0.93

B1 ("any industrial engagement") is positively and significantly associated with lecturer perceptions of feedback importance ($\beta = 1.429$, $t = 2.714$, $p < 0.01$). The odds ratio of 4.18 indicates that lecturers who engage in any industrial activity are over four times more likely to rate industry feedback as more important compared with their non-engaged peers, controlling for engagement frequency.

B3 ("frequency of engagement") has a small, negative coefficient ($\beta = –0.078$) that is not statistically significant ($t = –0.681$, $p > 0.05$). Its odds ratio of 0.93 suggests that each one-unit increase in engagement frequency yields a 7% decrease in the odds of assigning higher importance to industry feedback, though this effect is not distinguishable from zero.

Threshold estimates: The model estimated four threshold parameters separating the five categories of C3. These cutpoints (τ_1 through τ_4) range from –2.43 to 0.54, confirming the

underlying ordinality of the outcome. While threshold values are not the focus of substantive interpretation, they ensure that the proportional-odds assumption holds across adjacent response levels.

Discussion

The strong, positive association between any form of industrial engagement (B1) and the perceived importance of industry feedback underscores a critical threshold effect. Once lecturers participate in even minimal collaborative activities such as site visits, guest lectures, or joint workshops they appear substantially more inclined to value feedback from industry when shaping curricula. This finding suggests that experiential exposure to industry contexts primes educators to recognize the practical insights that external partners can contribute.

In contrast, the non-significant effect of engagement frequency (B3) indicates that simply increasing the number of interactions does not further elevate the perceived importance of feedback. This may reflect a quality–quantity trade-off: after an initial engagement "threshold" is crossed, additional meetings may offer diminishing marginal utility unless they are structured to deliver new, actionable insights. It also highlights potential measurement limitations, as the frequency scale may not capture the depth or substantive content of engagements.

Implications for policy and practice

These results have direct relevance for institutional strategies and policy design

Activate baseline engagement: Mandating a minimum level of industrial engagement for all lecturers (e.g., one or two collaborative activities per semester) could trigger a significant increase in the valuation of partner feedback thereby fostering more industry-informed curriculum reviews.

Focus on engagement quality: Institutions should refine engagement protocols to ensure that early interactions are substantive emphasizing co-development of modules, joint problem-solving sessions, or site-based curriculum audits rather than merely increasing meeting counts.

Revise monitoring metrics: Rather than tracking frequency alone, performance indicators should incorporate measures of engagement depth, such as the number of co-authored curriculum revisions or the substantive input provided by industry representatives.

Alignment with literature: The threshold effect of "any engagement" aligns with prior qualitative research findings that introductory industry experiences often reshape educator attitudes more than repetitive, superficial contacts. This study extends studies on TVET in Nigeria, which emphasize the importance of structured partnerships for curriculum relevance and graduate employability. Our quantitative validation adds statistical rigor to these insights, demonstrating that crossing the engagement threshold yields outsized attitudinal shifts.

Limitations and future research

This analysis is cross-sectional and relies on self-reported engagement measures, which may introduce recall or social-desirability bias. Future research should disaggregate B1 into specific activity types to identify which formats (e.g., on-site mentoring vs. curriculum co-design) drive the strongest attitudinal responses. Also, there is need to develop multidimensional engagement scales that capture depth, resource sharing, and outcome orientation. Employ longitudinal designs or quasi-experimental interventions to assess causal impacts on both educator perceptions and student outcomes

Conclusion

While the sample size reflects practical constraints, its small size limits generalizability and statistical power. However, this study investigated the factors influencing TVET lecturers' valuation of industry feedback in curriculum design, using an ordered logistic regression model on survey data from 69 Nigerian TVET institutions. The analysis reveals a pronounced threshold effect: lecturers who engage in any form of industrial partnership (B1) are over four times more likely (OR = 4.18) to rate industry feedback as "somewhat important" through "very important," compared with non-engaged peers. In contrast, the frequency of engagement (B3) shows no statistically significant association with perceived feedback importance (OR = 0.93, $p > 0.05$). Model diagnostics (log-likelihood = –81.75; AIC = 175.50) confirm the adequacy and stability of the proportional-odds specification. Collectively, these results underscore that simply initiating engagement, rather than increasing its frequency drives attitudinal shifts toward valuing industry input in curriculum review.

The ordered logistic regression demonstrates that merely initiating industrial engagement transforms lecturers' valuation of industry feedback in curriculum design. By targeting this initial threshold and enhancing the substance of collaborative activities, TVET institutions in Nigeria can harness partner insights more effectively, ultimately improving curriculum relevance and strengthening workforce readiness.

In everyday terms, our study shows that TVET teachers who team up with industry even once are much more likely to see company feedback as valuable when designing their courses, more than four times as likely, than those who never partner with businesses. Simply meeting more often doesn't add much: it's the first step of connecting with industry that really shifts their attitude. In other words, once a teacher experiences any real collaboration with a company, they recognize the benefit of tapping into workplace insights to make their lessons more practical and up to date.

Recommendations

Mandate baseline industrial engagement

Require each lecturer to participate in at least one structured industry activity annually (e.g., site visit, guest lecture, co-design workshop). Integrate these engagements into performance appraisal and promotion criteria.

Emphasize depth and deliverables

Develop standardized engagement protocols that specify clear outputs such as jointly authored module outlines or industry-validated assessment items to ensure substantive interaction. Offer templates for Memoranda of Understanding that define roles, timelines, and expected curriculum inputs.

Refine monitoring metrics

Replace simple counts of meetings with multidimensional indicators capturing activity type, duration, resource contributions, and curriculum outcomes. Implement an institutional dashboard for real-time tracking of engagement quality and feedback utilization.

Establish institutional support structures

Create dedicated Industry Liaison Units to broker collaborations, manage partnerships, and curate engagement calendars. Allocate seed funding or micro-grants to incentivize pilot projects that integrate industry feedback into course redesign.

Embed feedback requirements in accreditation

Collaborate with regulatory agencies to include documented industry feedback mechanisms as mandatory accreditation criteria for TVET programs. Offer matching-fund incentives for private-sector contributions toward curriculum enhancement.

Advance research and capacity building

Conduct longitudinal and experimental studies to assess the causal impact of engagement interventions on both educator attitudes and student employability metrics. Organize professional-development workshops on partnership management, feedback integration, and impact evaluation for academic staff.

By prioritizing the initiation of meaningful industry engagement and embedding substantive feedback mechanisms into institutional processes, Nigerian TVET institutions can significantly elevate the relevance and quality of their curricula thereby strengthening graduates' readiness for the labour market and contributing to national skills development.

Acknowledgements

We acknowledge the support of Nigerian TVET lecturers who supported this study by making out time to respond to the Google questionnaires.

References

Akinola, A. S., Eze, G. E., Ali, C. C., Afred, O. F., Attah, B. I. (2020). Challenges facing TVET institution–industry collaboration in skills acquisition for sustainable growth in Nigeria. *Vocational and Technical Education Journal*, 2(2), 231–238.

Egbri, J. N., Chukwuedo, S. O. (2013). Re-engineering technical vocational education and training (TVET) in Nigeria through school–industry collaboration for capacity building. *Nigerian Vocational Association Journal*, 18(1), 74–82.

Eze, T. I., Okorafor, A. O. (2012). New approaches to the development of technical, vocational

education and training (TVET) curriculum for improved labour productivity. *International Journal of Education Researcher,* 12(1), 101–108.

Federal Republic of Nigeria. (2004). *National policy on education (4th ed.).* Nigerian Educational Research and Development Council.

Freeman R. E, Jeffrey S. H, Andrew C. W, Bidhan L. P, Simone de Colle (1984). *Stakeholder theory: the State of the art.* Cambridge University Press. Amazon.com

Nwoye, E. G., Ndubuisi, B. N., Omale, B. A., Sukkuk, N. I. (2016). Strategies for enhancing TVET–industrial linkage for skill training and sustainable national development. *Journal of Association of Vocational and Technical Educators of Nigeria,* 7(3), 52-62.

Okoye, R. K. E., Arimonu, M. O. (2016). Technical and vocational education in Nigeria: issues, challenges and a way forward. *Journal of Education and Practice*, 7(3), 113-118.

Onwusa, S. C. C. (2021). The issues, challenges and strategies to strengthen technical, vocational education and training in Nigeria. *International Journal of Research and Innovation in Social Science,* 5(5), 48-59.

Rogers, E. M. (2003). *Diffusion of innovations (5th ed.).* New York: Free Press

Soares, L. (2010). *The power of the education-industry partnership: fostering innovation in collaboration between community colleges and business*. Center for American Progress.

Ugwoke, E. O., Ezeji, H. A., Edeh, N. I., Etonyeaku, E. A. C. (2016). Effective implementation of TVET-industry partnership for employability of graduates through work integrated learning in Nigerian universities. *Review of European Studies,* 8(3), 307-315.

UNESCO, ILO. (2002). *Revised recommendation concerning technical and vocational education and training (2001*). UNESCO/ILO.

UNESCO. (2004). *Learning for work, citizenship and sustainability: International experts meeting* [Unpublished meeting report]. UNESCO.