Integration and validation of e-commerce tax compliance instrument beyond the conventional methods

Saidu, Mansur Adam[1] Shamsudeen Ladan Shagari[2], Muhammad Auwal Kabir[3], Abdulkadir Abubakar[4]

[1]*Department of Vocational and Technology Education,*
Abubakar Tafawa Balewa University Bauchi, Nigeria.
[2, 3 & 4] *Department of Accounting, Faculty of Management Sciences,*
Bauchi State University Gadau, Nigeria.

Correspondence Email: smadam@atbu.edu.ng

Abstract
Tax compliance intention among individuals facilitates the government's pursuit of increased tax revenues, particularly within e-commerce which is driven by users' behaviours. However, the scarcity of a more robust psychometric instrument for measuring e-commerce users' behaviours and tax compliance intentions, considering technology optimism, remains evident. Despite the need to report face, content, and pilot study validations, the quest for an improved instrument persists from previous studies. This study addresses these gaps by integrating and developing a new instrument. Employing a multi-stage methodology, the instrument underwent assessment for face and content validity by three university experts. Subsequently, a pilot study involving a sample of 40 SME operators, well-versed in practical e-commerce, was conducted. Data validation was collected on a 4-point rating scale. SPSS version 26 was used for the validation analysis, while the pilot reliability was assessed using SmartPLS version 4. The results highlight the newly integrated instrument's clarity and validity, endorsing its appropriateness for subsequent data collection and analysis in both pilot and extended e-commerce and tax compliance intention studies, in line with technology optimism measures. This study has implications for the instrument's clarity and validity, adequately fulfilling the psychometric criteria inherent to a newly developed and comprehensively reported instrument.

Keywords: E-commerce, Tax compliance intention, Technology optimism, Instrument development and integration, Face and content validation, Pilot study

1. Introduction
Enhanced tax compliance intention by individuals aids the government in achieving higher tax revenues, fostering economic growth and advancing development, particularly within e-commerce. E-commerce has a direct association with rising online sales, tax revenue, and income generation is the reason for this phenomenon in numerous countries globally (Argilés-Bosch et al., 2020; Baozhuang et al., 2021). Besides, the regulatory impact of e-commerce significantly promotes Value Added Tax (VAT) payments across various economies, especially as more countries transition to digital economies (Yumin & Liu, 2023). In that regard, Jiang et al. (2022) observe that a positive outlook on adopting new business technologies has improved the e-commerce experiences of many users. Similarly, rising technology optimism and the use of online business technologies among e-commerce users have facilitated increased tax revenue through their intention to comply with taxes (Baozhuang et al., 2021; Mu et al., 2022). This signifies that individuals' tax commitment boosts revenues and spurs e-

commerce growth. VAT compliance is also tied to technology optimism and the online business usage of individuals.

Exploring the relationship between e-commerce, technology optimism, and tax compliance intention requires analysing behavioural, social, and environmental factors, along with the tax knowledge and awareness of e-commerce platform owners and users (Atanassova, 2018; Mu et al., 2022; Wu et al., 2020). That is why understanding people's behaviour that promotes their attitudes is crucial in increasing tax compliance intention (Kupoluyi et al., 2022; Vissaro, 2023). This, in turn, contributes to boosting government spending for the overall welfare of a nation, particularly in e-commerce, where VAT is paid on various virtual transactions worldwide. It involves obtaining a suitable and appropriate measurement instrument to assess users' behaviours, attitudes, and e-commerce knowledge, which will enhance tax compliance intention while considering the influence of technology optimism.

However, prior studies on e-commerce, tax compliance intention, and technology optimism mostly focused on primary data collection, thereby, overlooking the discussions about ascertaining the face and content validation of their measurement instruments as well as explaining pilot study specifics (Ay et al., 2021; Bestaria et al., 2019; Filotto et al., 2020; Kurniawan, 2020; Li et al., 2020; Mulya, 2020; Pratama & Jin, 2019; Solichin et al., 2021; Tran & Hong, 2021). These studies reveal a widespread lack of pilot study utilisation in previous studies concerning global e-commerce, tax compliance intention, and technology optimism. Even where such instrument development procedures were reported at a pilot test level (Al-Ttaffi et al., 2020; Chen & Li, 2020; Gupta et al., 2020), very minimal attention was given to the issues in the African context (Bani-Khalid et al., 2022). This highlights the need for improved research instrumentation with stronger psychometric qualities, which

would assess both face and content validity while accounting for the circumstances of developing countries during pilot studies.

The properties of a new scale in a pilot study are mainly shaped by how well it measures what it's supposed to. This is because the psychometric properties of a new scale's measurements are mainly affected by its content validity (Ephrem & Murimbika, 2023). Researchers need to offer a thorough explanation of how they validated the instrument. Neglecting proper instrument validation can frequently affect the accuracy and reliability of data analysis, leading to wasted time and resources due to potentially inaccurate results that misguide discussions and conclusions (Memon et al., 2023). Additional validation steps are to be taken to evaluate an instrument's psychometric characteristics, including construct validity, reliability, and dimensionality. That was why, if the instrument is proven valid and reliable during the psychometrics validation phase, it could greatly help examine what it was supposed to measure (Pantuzza et al., 2023). In general, multiple experts in a given field are required to confirm the face and content validity, depending on the research.

Ensuring the overall validity requires content validity, which should be conducted systematically. Content validity is crucial for ensuring that a measurement tool, like a research questionnaire, accurately represents the measured construct (Yusoff, 2019). Performing systematic content validation based on evidence and best practices is essential to support an instrument's overall validity. In terms of content validity, experts need to confirm that the questionnaire items are relevant, representative, and comprehensive (Memon et al., 2023). In particular, PhD and postdoc students are typically asked to use a questionnaire to give their input on whether a measurement item is clear, valid, and relevant to the intended audience (Lin et al., 2023; Owiti & Hauw, 2023). For basic

research with one data source, simple empirical studies usually require three to five domain-knowledge experts for assessment (Memon et al., 2023). They further note that, while direct interaction with experts is advised for validation, gathering feedback through email can be valuable for future evidence if done thoughtfully. However, removing certain dimensions from the questionnaire can alter the construct's domain name and intention. Similarly, face validity is about whether a measurement appears to be doing its intended task. In simple words, if a test is designed to measure intelligence but doesn't appear to do so to observers, it lacks face validity (Crump, 2018). Crump further notes that face validity helps researchers consider intuitions, prompt substantive critique, and impact public opinion's influence on decisions, notably in applied research affecting policies. Experts will assess the questionnaire items to ensure they are clear, appropriate, logically connected, and properly formatted for face validity. Experts' feedback and perceptions about the suitability of items in a newly developed instrument are gathered through a face validity assessment (Ismail et al., 2022). Several researchers consider face validity to be a part of content validity, as both involve having experts review the instrument to ensure it accurately measures the intended concept (Amini et al., 2022). Thus, the value of face validation in psychometric testing involves superficially assessing instrument understandability and acceptability from experts.

The traditional method of checking an instrument's face and content is understandability, but it has a lot of shortcomings (Lam et al., 2023). In addition to lacking a clear, theory-driven operational definition that impacts content validity, current scales are also inadequately specified (Ephrem & Murimbika, 2023). Precisely, there's doubt about whether the traditional face and content validation methods can detect items that the intended

audience finds hard to understand (Lam et al., 2023). Previous studies have also lacked a single unified theory and have fragmented content on instrument development and validation (Ephrem & Murimbika, 2023). Common issues found in methodology sections include insufficient context information, unclear inclusion/exclusion criteria, inconsistent operationalisation of key concepts, and inadequate explanations for instrument validation and pilot studies (Memon et al., 2023). The existing content validity measurement models have similarities and differences, but their lack of theoretical integration and thoroughness limits how well they work in real life (Ephrem & Murimbika, 2023). This happens because different studies include or leave out dimensions inconsistently. Such issues highlight the need for stronger research instrumentation that aligns with psychometric standards to gauge a specific construct within a designated conceptual or theoretical framework of a particular study. Several studies recently and currently have tried to develop or integrate new instruments while taking into account their face and content validation. Yet, the major sectors that have recently contributed to developing and accessing instrument content and face validity are primarily the Health sector (Boome et al., 2022; Osorio-Castaño et al., 2023; Pantuzza et al., 2023), Athletic career (Owiti & Hauw, 2023), Virtual reality (Babar et al., 2023) and Secondary Education (Amini et al., 2022; Gracia et al., 2021) among others. To the best of the researchers' abilities, very little is known in the areas of business, taxation and finance, other than the entrepreneurship study by Ephrem and Murimbika (2023). This brings about the need to develop objective measures of behaviour, achieved by designing experimental situations based on different contexts (Ephrem & Murimbika, 2023) as well as face, construct, and criterion validity for better instrument development (Shrotryia & Dhanda, 2019). As a result, the current

study aims to fill this research gap by integrating and validating a questionnaire that measures e-commerce behaviour and tax compliance intention in the presence of technology optimism. The new instrument contributes to the field by providing a more comprehensive and unified approach to measuring the variables of the study. Specifically, integrating and validating the new instrument provides significant help to the global research community to understand how e-commerce users' behaviours and tax compliance intentions relate to their technology optimism.

2. Literature Review

Instrument Validation

Instrument validation is a significant step in a research process. It is highly needed when developing new instruments or validating and integrating new items or measures into an existing instrument (Memon et al., 2023; Pantuzza et al., 2023). It involves the testing of an instrument's reliability and validity to ensure it accurately measures what it is intended to measure. Researchers are expected to thoroughly explain how they validated their instruments. Skipping this validation step can affect their data accuracy and reliability, wasting time and resources with potentially misleading results (Memon et al., 2023). Additional steps needed include evaluating the instrument's psychometric qualities, such as construct validity, reliability, and dimensionality. Thus, researchers must address three key steps: face validity, content validity, and pretesting before the final data collection. This, in turn, increases the confidence in the final results obtained using that instrument

Content Validation

Ensuring the content validity of a new instrument or upgrading an existing one is a key contribution to research methodology. Content validity which is confirmed by experts, ensures that a research measurement instrument like a research questionnaire truly represents what they

measure (Yusoff, 2019). Independent researchers as well as postgraduate students including masters, PhD and postdoc students often assess and test the content validity for clarity, validity, and relevance of the measurement instrument (Lin et al., 2023; Owiti & Hauw, 2023). However, lacking a clear, theory-driven definition of an instrument greatly affects the content validity of a given instrument (Ephrem & Murimbika, 2023).

Face Validity

Face validity refers to the process of checking if an instrument appears to measure what it was designed to do. Crump (2018) points out that face validity helps researchers to trust their instincts, get valuable feedback, and consider how the public perceives their instrument. Researchers are expected to review questionnaire items to ensure they are clear, relevant, logically connected, and well-structured for face validity. This is because, the suitability of items in a new instrument is partly achieved through a face validity assessment (Ismail et al., 2022). This process is often seen as a part of content validity, as both involve experts checking if the instrument accurately measures the intended concept it was designed to achieve (Amini et al., 2022). This will involve a robust assessment of how understandable and acceptable an instrument appears to be, based on the responses from the assessors (Lam et al., 2023). Therefore, if face validity is properly executed, it will help to provide a more vigorous evaluation of an instrument's validity.

3. Method and the Development Processes

A multi-stage approach including Item generation, Content validation, Expert analysis, Statistical analysis, Discussion and Conclusions was used in line with the study of Pantuzza et al. (2023). A convenience sampling technique was employed in selecting three experts for the validation of the proposed instrument. The new instrument consists of six Content

Validation Index (CVI) procedures as opined by Tsang et al. (2017); Yusoff (2019); Zamanzadeh et al. (2015). However, the study's instrument follows the process of item development and preparation for presentation to experts, including checking for face and content validity and pilot testing as postulated by Shrotryia and Dhanda (2019); and Memon et al. (2023). The Validation data were collected on a 4-point rating scale and were analysed using SPSS version 26. The pilot reliability result was analysed using SmartPLS version 4.

Step 1: Preparing a content validation form

The indicators for the six constructs of the study were all adapted from previous studies. The adapted instrument included aspects of e-commerce users' behaviour, tax compliance intentions, and technology optimism. In an adaptive instrument, the items administered to each individual can align with the respondents' attribute level, whether used previously or not (DeVellis, 2017). On that note, the 33 adapted measurement items were used based on their relationship with the current study's constructs. Table 7 contains the summary of all the adapted measurement items and their respective reliabilities and sources. Some

adapted measurement items were later changed to combine positive and fewer negative items. Hair, Marcelo, et al. (2019) recommend that 10 per cent of indicators be negatively worded to minimize response bias. In addition, the measurement items were mixed to avoid respondents' illogical responses or straight-lining the responses that may affect the final result's normality. The six negatively stated items are indicated in Table 7 using an asterisk (*) under Appendix I. They are ATT2, BHC6, SJN4, TXA4, TCI4 and TEO3.

The researchers in Table 1 also adapted the content validation form and its measurement scales from Yusoff (2019), Kahiigi and Semwanga (2020) and Tsang et al. (2017). The experts' designation and experience items were adapted from Shrotryia and Dhanda (2019) for inclusion in the content validation form. Finally, the complete content validation form and its degree of relevance on a 4-point rating scale are available in Appendix II as used by prior researchers (Gracia et al., 2021; Lin et al., 2023). On the 4-point rating scale: 4 means the measurement item is highly relevant, 3 indicates the measurement item is quite relevant, 2 suggests the measurement item is somehow relevant, and 1 signifies the measurement item is not relevant.

Table 1: Content Validation Form Details and Sources

S/N	Particulars	Sources
1.	Experts' designation and experience	Shrotryia and Dhanda (2019)
2.	Degree of Relevance Scale	Yusoff (2019)
3.	Constructs Definition	Yusoff (2019)
4.	General questions on the content validity	Tsang et al. (2017), Kahiigi and Semwanga (2020)

Step 2: Selecting a review panel of experts

Regarding the instrument's internal validity, the study's instrument was given out for face and content validation to three experts using a convenience sampling technique. The experts were from the Department of Accounting and Business Education (Accounting) unit of the

Department of Vocational Technology Education, all in Abubakar Tafawa Balewa University Bauchi, in Nigeria. The experts were from the same institution, with vast experiences, and they came from different departments and held different ranks, as used in the study by Lin et al. (2023) and Pantuzza et al. (2023). The selection of the three experts is because Yusoff (2019)

stated that the minimum acceptable number of experts for content validation is three (3) with an acceptable Content Validation Index (CVI) value of at least 0.80. Yusoff also states that the maximum number of experts for content validation is nine (9), with an acceptable CVI value of at least 0.78. These experts are academicians and, at the same time, accounting lecturers and practitioners, who teach, conduct, and supervise a series of research studies over a long time.

The experts' contributions and feedback (as seen in Figure 1, 2 and 3 under Appendix III) guided the instrument development for the study. Usually, survey instruments are primarily given out for face and content validation to experts from academics and practitioners in a specific subject area or industry (Elangovan & Sundaravel, 2021). This is because a PhD and academic working experience are parts of the minimum requirement for an academician to validate an instrument (Hair, Marcelo, et al., 2019; Memon et al., 2023). However, the accounting lecturers from the departments were regarded as qualified experts to validate the present study's instrument in line with their accounting area of specialisation. See Table 2 for more information on the experts' designation and experience within their university.

Step 3: Conducting content validation
The instrument was subjected to the three experts for their judgments based on their designations and expertise. Besides, it serves as a piece of vital evidence to help the overall validity of a questionnaire for research (Yusoff, 2019). The content validation form was presented to the experts for objective review and suggestions. The experts filled in the content validation form to provide an authentic rating and objective report on the general validity of the items under the study's constructs of the whole instrument. Experts' assessments using the content validation form and validity ratio are parts of the approach for quantifying a study's instrument validity (Tsang et al.,

2017). Table 3 contains the details of their ratings while their comments were reported under Appendix III.

Step 4: Reviewing domain and items
Equally, the subjection of the instrument for face and content validation to the three mentioned experts was also to ensure that the appearance of the items is unique and can measure the correct latent variables. The experts filled in the content validation form and provided an authentic and objective report on the general validity of the items under the study's constructs of the whole instrument. Furthermore, the experts' assessment using content validation is part of the approach for quantifying a study's instrument validity (Tsang et al., 2017). As a result, the experts certified that the instrument meets the requirements of face validity and can be used in collecting primary data from the respondents (see Figure 1, 2 and 3 under Appendix III).

Step 5: Providing scores on each item
The information available in Table 3 is based on the CVI formula obtained from the work of Yusoff (2019), where experts-in-agreement is the sum of the relevant rating provided by all experts for each item; Universal agreement (UA) has a score '1' assigned to the item that achieved 100% experts in agreement. Furthermore, for I-CVI, the experts in the agreement are divided by the number of experts. The S-CVI/Ave (based on I-CVI) stands for the average of I-CVI scores across all items. The S-CVI/Ave (based on proportion relevance) stands for the average of proportion relevance scores across all experts, and lastly, the S-CVI/UA stands for the average of UA scores across all items.

Step 6: Calculating the CVI
The researchers used the content validity feedback to compute the instrument CVI. However, a content validity ratio was used in instrument validation computation. The widely used content validity ratio, introduced by Lawshe, lacks reported methods for calculating the original critical

values (Ayre & Scally, 2017). The CVI is based on the Content Validity Ratio (CVR) of Lawshe (1975) as extended by Lynn (1986) and reported by Hair, Marcelo, et al. (2019). Table 3 displays the relevance ratings on the item scale by the three experts. Each item is rated by Expert 1, 2 and 3, with a rating of 1 indicating relevance. The agreement between the experts is shown under "Experts in Agreement," where all items are rated 3 if they unanimously agree with an item. The Item-CVI (I-CVI) is calculated for each item by dividing the number of experts who rated it as relevant by the total number of experts, resulting in a score of 1 for all items. Similarly, the Universal Agreement (UA) is 1 for all items, indicating unanimous agreement among experts. Notably, items ATT2, SJN4, BHC6, TEO3 and TEO5 received mixed ratings, with one expert rating them as irrelevant, leading to lower I-CVI scores of 0.7 and a UA score of 0 for those items. The Scale Content Validity Index (S-CVI/Ave) is 0.95, demonstrating a high level of agreement among experts for the overall scale. Additionally, the Scale Content Validity Index (S-CVI/UA) is 0.85 and above $0.80 \approx$

1, reflecting the proportion of collective agreements across all items.

4. Results

In Table 2, the experts' academic ranks and corresponding working experience within their university are presented. The table reveals that the first validator is a professor with 1 to 5 years of working experience as a university professor, identified as an expert and experienced university lecturer. Similarly, the second validator is a senior lecturer with 6 to 10 years of working experience, also categorized as an expert and experienced university lecturer. Lastly, the third validator is a lecturer II with 1 to 5 years of working experience, also categorized as an expert and experienced university lecturer. They all possess PhDs and have up to 5 years of working experience in their current academic progress within their university. They are qualified to validate an instrument in their area of specialisation. This is because having a PhD and academic work experience are essential components of the minimum criteria for an academic to authenticate an instrument (Hair, Marcelo, et al., 2019; Memon et al., 2023).

Table 2: Experts' designation and experience within the University

S/N	Academic Rank	Working Experience	Remark
1	Professor	1 − 5 years	Expert and Experience Lecturer
2	Senior Lecturer	6 − 10 years	Expert and Experience Lecturer
3	Lecturer II	1 − 5 years	Expert and Experience Lecturer

Content Validation Output

Based on the content validation results as contained in Table 3. The Item-level content validity index (I-CVI) was 0.95, i.e., 95% rating agreement. Likewise, the Scale-level content validity index based on the average method (S-CVI/Ave) was 0.95 (i.e., 95% rating agreement). Finally, the scale-level content validity index based on the universal agreement method S-CVI/UA was 0.85 (i.e., 85% rating agreement).

Thus, the CVI meets the satisfactory index level. In addition, the questionnaire scale has also achieved a satisfactory level of CVI above the minimum threshold of at least 0.80 ($\approx$ 1) index for three experts' instrument assessments and ratings, as outlined by Davis (1992) and Yusoff (2019). This signifies that the instrument is clear and valid to be used for further data collection and analysis for a pilot study. Thus, the CVI was established.

Table 3: The relevance ratings on the item scale by the three experts

S/N	Items	Expert 1	Expert 2	Expert 3	Experts in Agreement	I-CVI	UA
1	ATT1	1	1	1	3	1.0	1
2	ATT2	1	1	0	2	0.7	0
3	ATT3	1	1	1	3	1.0	1
4	ATT4	1	1	1	3	1.0	1
5	ATT5	1	1	1	3	1.0	1
6	SJN1	1	1	1	3	1.0	1
7	SJN2	1	1	1	3	1.0	1
8	SJN3	1	1	1	3	1.0	1
9	SJN4	1	1	0	2	0.7	0
10	SJN5	1	1	1	3	1.0	1
11	SJN6	1	1	1	3	1.0	1
12	BHC1	1	1	1	3	1.0	1
13	BHC2	1	1	1	3	1.0	1
14	BHC3	1	1	1	3	1.0	1
15	BHC4	1	1	1	3	1.0	1
16	BHC5	1	1	1	3	1.0	1
17	BHC6	0	1	1	2	0.7	0
18	TXA1	1	1	1	3	1.0	1
19	TXA2	1	1	1	3	1.0	1
20	TXA3	1	1	1	3	1.0	1
21	TXA4	1	1	1	3	1.0	1
22	TXA5	1	1	1	3	1.0	1
23	TCI1	1	1	1	3	1.0	1
24	TCI2	1	1	1	3	1.0	1
25	TCI3	1	1	1	3	1.0	1
26	TCI4	1	1	1	3	1.0	1
27	TCI5	1	1	1	3	1.0	1
28	TCI6	1	1	1	3	1.0	1
29	TEO1	1	1	1	3	1.0	1
30	TEO2	1	1	1	3	1.0	1
31	TEO3	1	1	0	2	0.7	0
32	TEO4	1	1	1	3	1.0	1
33	TEO5	1	0	1	2	0.7	0
					S-CVI/Ave =	0.95	
					S-CVI/UA =		0.85
Proportion Relevance		0.97	0.97	0.91			
The average Proportion of Items Judged as relevant across the three experts			0.95				

Demographic Profile of the Respondents

The demographic information of the respondents provides a detailed description of the respondents during the pilot study on some small and medium scale Enterprises (SMEs) operators in Kano State. Table 4 below shows the breakdown of the respondents' demographic information for the pilot study. Regarding the respondents' ages, the majority of them fall within the 26-35 years category, comprising 40% of the pilot sample. The 15-25 years age group accounts for 23%, while the 36-45 years group represents 25%. Moreover, those above 45 years represent 13% of the total sample. In terms of gender, the majority of the respondents are male (68%), while the remaining 33% are female. The table shows that the respondents in the pilot study were relatively young and male-dominated. Lastly, the table provides a clear overview of the age and gender distribution within the pilot sample of 40 respondents.

Table 4: Demographic Information of the Respondents

Variables		Frequency	Per cent
Respondents' Ages	15 -25 years	9	23
	26 – 35 years	16	40
	36 - 45 years	10	25
	Above 45 years	5	13
	Total	40	100
Gender	Male	27	68
	Female	13	33
	Total	40	100

Reliability of the Instrument

The reliability of the instrument was determined using a pilot study. A pilot study was undertaken for future broader experimentation of the new instrument. Mostly, conducting a pilot study is to prepare, design, and test the capabilities of the study instrument, measures, procedures or enlistment criteria (Fraser et al., 2018). In addition, the researchers conducted the pilot test study on some SME operators in Kano State, Nigeria, with the help of two research assistants. A small sample of 40 SME operators was used across the available SMEs using a snowballing sampling technique of those with practical experience in e-commerce trading. The 40 samples were selected because Tsang et al. (2017) and Saunders et al. (2019) asserted that an instrument should be pilot-tested on a small sample of 30 to 50 respondents. The result of the pilot study helps in analysing the internal consistency of the constructs and was determined using Cronbach's Alpha and Jöreskog's (1971) composite reliability.

After completing the pilot test study, Table 5 revealed that both Cronbach's Alpha and composite reliability had higher reliability outcomes. The result shows Cronbach's Alpha values ranging between 0.721 to 0.926, while the composite reliability statistics had index values ranging from 0.840 to 0.940. The composite reliability statistics is more reliable by having higher values than Cronbach's Alpha reliability. Both Cronbach's Alpha and composite reliability had reliability index values over the required minimum threshold value of 0.70 (Hair et al., 2021). The analysis of the pilot study showed that reliability estimates were acceptable for meeting the minimum reliability requirement. Thus, the constructs' reliability for the pilot study was established. This implies that the data is reliable, and the measurement tools used are dependable, thereby providing confidence in the data's consistency and accuracy.

Table 5: Pilot Test Reliability Analysis Summary

Constructs	Cronbach's alpha	Composite reliability
Attitude	0.721	0.840
Behavioural Control	0.926	0.940
Subjective Norms	0.765	0.859
Tax Compliance Intention	0.843	0.894
Technology Optimism	0.879	0.914
Tax Awareness	0.769	0.867

Factor loadings

A factor loading is a correlation between a variable and a factor in a given research framework. Factor loadings reveal the correlation between the original variables or the factors towards understanding the nature of a particular factor ranging between +1.0 to -1.0 (Hair, Black, et al., 2019). This measures how strongly a variable is associated with a factor. The result from Table 6 reveals that the majority of the indicators obtained from the pilot study had factor loadings above 0.70, while the fewer items below the benchmarks were discarded. Hence, loadings exceeding 0.70 are considered indicative of a well-defined structure and meet the goal of any factor analysis (Hair, Black, et al., 2019; Hair et al., 2022). Thus, it implies that all the remaining indicators met the minimum goal of the factor analysis and satisfied the factor loading conditions for further analysis.

Table 6: Factor loadings

Variables	ATT	BHC	SJN	TCI	TEO	TXA
ATT2	0.785					
ATT4	0.776					
ATT5	0.830					
BHC1		0.821				
BHC2		0.896				
BHC3		0.893				
BHC4		0.899				
BHC5		0.757				
BHC6		0.836				
SJN1			0.806			
SJN2			0.917			
SJN3			0.725			
TCI1				0.823		
TCI2				0.882		
TCI3				0.803		
TCI4				0.786		
TEO2					0.766	
TEO3					0.899	
TEO4					0.861	
TEO5					0.877	
TXA1						0.746
TXA3						0.854
TXA5						0.876

Note: ATT: Attitudes; BHC: Behavioural Control; SJN: Subjective Norms; TCI: Tax Compliance Intention; TEO: Technology Optimism; TXA: Tax Awareness.

Discussion

The current study achieves its objective by integrating different constructs' items into developing a new instrument for measuring e-commerce tax compliance. The study however found that the new instrument is clear, valid and reliable to be used for further data collection and analysis. This was based on its face and content validity alongside the instrument's reliability indexes. The researchers successfully integrated the various construct items to develop a unique measurement instrument that was validated by academicians and accounting experts in a Nigerian university. This methodological contribution aligns with the assertions of Aminul Islam (2020a, 2020b, 2021) and Sharif (2023), that integrating, testing and validating a new instrument using different measurement items in line with a study's variables is a methodological contribution of a study. The new instrument's clarity, validity, and reliability indexes obtained in this study affirm its suitability for further data collection and analysis. This finding supports its use in data collection and analysis which is consistent with previous research outputs (Pantuzza et al., 2023; Owiti and Hauw, 2023; Osorio-Castaño et al., 2023; Ephrem and Murimbika, 2023; Amini et al., 2022), thereby highlighting the importance of instrument development and validation across various fields. Thus, the current study affirms the importance of developing, validating, and utilising effective instruments for capturing and measuring key variables, thereby advancing research methodology in relevant fields of study.

The current finding further extends the previous research works on instrument development and validation in the fields of business and management research from social science perspective. The successful integration of reliable measurement instruments in this study aligns with the previous work on instrument development and validation. In particular, it confirms the work of Pantuzza et al. (2023) and Owiti and Hauw (2023) on instrument development, data collection and analysis. Similarly, the validation of the Care Quality Ambulatory-I instrument by Osorio-Castaño et al. (2023) also confirms the current study's emphasis on instrument clarity and validity. The adaptation of existing instruments for new applications, as demonstrated by Lin et al. (2023), also aligns with the current study's finding. Lastly, the entrepreneurial potential measurement scale by Ephrem and Murimbika (2023) and the innovative use of questionnaires by Babar et al. (2023) and Ismail et al. (2022) underscore the importance of advancing assessment methods and the innovative use of questionnaires similar to the current study's emphasis on clear, valid and reliable instruments. It can be noted from the current and previous findings that a research instrument needs to be first validated and pilot tested before using it in the final data collection and analysis of the main study. This is done for sake of clarity, validity and reliability of the new or integrated instrument in social science studies by independent researchers or postgraduate research students.

Conclusion

In conclusion, the successful validation of the instrument's clarity and validity highlights its crucial role in advancing research and ensuring methodological rigour across diverse fields of study. What sets the current finding apart is its uniqueness in the specific business domain of study and the distinctive developing country context it addresses (i.e., Nigeria). While the previous studies cover a range of subjects, from healthcare quality assessment to educational instruments and sports-related assessments, the current

finding is unique in its focus on a particular e-commerce, tax compliance intention and technology optimism research area. Future studies in business and other related social sciences can use this technique to validate their instruments during the pilot study.

Implication of the Study

The practical implication lies in the clarity and validity of the instrument for further data collection and analysis which points to the importance of ensuring proper measurement in the process of advancing research. This specific validation process is tailored to the instrument under study, contributing to the broader discourse on the significance of methodological contribution in research across diverse business and finance fields. Given the practical implications of this study, it is recommended that researchers and postgraduate students should prioritise methodological rigour on the instrument's clarity and validity in research, particularly in the validation of measurement instruments across diverse business and finance fields.

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Appendix I: Adapted Measurement Items and Sources

Table 7: The summary of adapted measurement items of the study

Perceived E-commerce Users' Behavioural Measurement Items	Reliability	Sources
S/N Attitudes (ATT)		
1 I think I should be honest in using e-commerce platforms while in school	0.8194	Taing and Chang (2020)
2 I will hack any e-commerce platform application if I have the chance to do it *		
3 I think judicious use of e-commerce platforms is my obligation		
4 I think manipulating e-commerce platform information is very wrong		
5 I always obey and follow the e-commerce platform's guidelines		
Behavioural Control (BHC)		
1 E-commerce is compatible with the devices that I am using	0.7050	Pratama and Jin (2019)
2 After having resources and knowledge, it would be easy for me to access the e-commerce platform		
3 E-commerce trading fits well with the way I like to do online transactions		
4 The internet connection on my device is excellent and stable to access e-commerce platforms		
5 My important colleagues assist me in using e-commerce platforms when I face difficulties		
6 I do not transact e-commerce in my country with or without tax payment *	0.8141	Taing and Chang (2020)
Subjective Norms (SJN)		
1 Knowing or seeing my friends who use e-commerce platforms encourages me to use it	0.6880	Pratama and Jin (2019)
2 My colleagues recommend the usage of e-commerce to me		
3 Using e-commerce is such a fashionable way of online transaction		
4 It is not vital to have an e-commerce trading account while studying *		
5 I believe that the e-commerce platform payment system is just	0.8913	Taing and Chang (2020)
6 I believe the government will regulate the e-commerce platform's information properly		
Tax Awareness (TXA)		
1 I am aware of some of the existing e-commerce taxes in my country	0.8161	Taing and Chang (2020)

2	I know that different e-commerce transactions will require the payment of different taxes		
3	I know that it is good to pay e-commerce tax to the government		
4	I do not have a good e-commerce tax awareness perception *		
5	I know that paying e-commerce taxes contributes to the economy of my country		

Tax Compliance Intention Measurement Items   **Reliability**   **Sources**

		Reliability	Sources
1	I intend to use e-commerce platforms even if they deduct taxes from my transactions	0.7520	Pratama and Jin (2019)
2	I will agree for VAT tax to be included in my e-commerce payments		
3	Knowing more about e-commerce taxes will increase my tax compliance	0.7000	Nurlis and Ariani (2020)
4	A lack of information about e-commerce taxes will not decrease users' tax compliance *		
5	More e-commerce tax compliance intention is good for my country		
6	I will disseminate e-commerce tax compliance provisions to my colleagues if I know more about it		

Technology Optimism Measurement Items (TEO)

1	Using e-commerce technology contributes to a better quality of life	0.8100	Parasuraman and Colby (2015)
2	E-commerce technology gives me more control over business lives		
3	I do not like the impression of doing e-commerce business *		
4	E-commerce products and services that use modern technologies are more convenient for me		
5	Using e-commerce helps me build stronger business relationships		

Appendix II: Content Validation Form and Degree of Items Relevance

A Content Validation Study Form on the Perceived E-commerce Behaviour, Tax Compliance Intention and Technology Optimism

Dear Expert,

The study's instrument contains six (6) constructs and measurement items. The researcher solicits your professional judgement on the degree of relevance of each measurement item from the study's instrument based on the terminology used by the researcher, as provided below.

Please select your expert designation and experience within your University

S/N	Academic Rank	Tick one, please	Working Experience	Tick one, please
1.	Professor		1 – 5 years	
2.	Associate Professor		6 – 10 years	
3.	Senior Lecturer		11 – 15 years	
4.	Lecturer I		16 – 20 years	
5.	Lecturer II		21 – 25 years	
6.	Assistant Lecturer		26 – 30 years	
7.	Graduate Assistant		31 years and above	

Your objective review under the following rating scale is highly needed:

Please Note the Degree of items' relevance as follows:

The scale of 4 = the measurement item is highly relevant
The scale of 3 = the measurement item is quite relevant
The scale of 2 = the measurement item is somehow relevant
The scale of 1 = the measurement item is not relevant

Instrument Measurement Items	Relevance Scale			
E-commerce Users' Behavioural Items **Definition:** E-commerce users' behaviour explains the behaviour of users using online trading platforms and virtual payments.	4	3	2	1
S/N **Attitudes**				
1 I think I should be honest in using e-commerce platforms while in school				
2 I will hack any e-commerce platform application if I have the chance to do it				
3 I think judicious use of e-commerce platforms is my obligation				
4 I think manipulating e-commerce platform information is very wrong				
5 I always obey and follow e-commerce platforms' guidelines				

	Subjective Norms				
1	Knowing or seeing my friends who use e-commerce platforms encourages me to use it				
2	My colleagues recommend the usage of e-commerce to me				
3	Using e-commerce is such a fashionable way of online transaction				
4	It is not vital to have an e-commerce trading account while studying				
5	I believe that the e-commerce platform payment system is just				
6	I believe the government will regulate the e-commerce platform's information properly				
	Behavioural Control				
1	E-commerce is compatible with the devices that I am using				
2	After having resources and knowledge, it would be easy for me to access the e-commerce platform				
3	E-commerce trading fits well with the way I like to do online transactions				
4	The internet connection on my device is excellent and stable to access e-commerce platforms				
5	My important colleagues assist me in using e-commerce platforms when I face difficulties				
6	I do not transact e-commerce in my country with or without tax payment				
	Tax Awareness				
1	I am aware of some of the existing e-commerce taxes in my country				
2	I know that different e-commerce transactions will require the payment of different taxes				
3	I know that it is good to pay e-commerce tax to the government				
4	I have no good e-commerce tax awareness perception				
5	I know that paying e-commerce taxes contributes to the economy of my country				
Tax Compliance Intention Items **Definition:** Tax compliance is the extent to which individual taxpayers abide by a given state's existing tax laws and regulations.		**4**	**3**	**2**	**1**
1	I intend to use e-commerce platforms even if they deduct taxes from my transactions				
2	I will agree for VAT tax to be included in my e-commerce payments				
3	Knowing more about e-commerce taxes will increase my tax compliance				
4	A lack of information about e-commerce taxes will not decrease users' tax compliance				
5	More e-commerce tax compliance intention is good for my country				
6	I will disseminate e-commerce tax compliance provisions to my colleagues if I know more about it				

Technology Optimism Items **Definition:** Technology optimism is a positive belief that technology provides increased control and efficiency to people's lives and work.				
1	Using e-commerce technology contributes to a better quality of life				
2	E-commerce technology gives me more control over business lives				
3	I do not like the impression of doing e-commerce business				
4	E-commerce products and services that use modern technologies are more convenient for me				
5	Using e-commerce helps me build stronger business relationships				

Please provide your expert opinion on the study's instrument presented to you under the following heading

S/N	General Questions on the Measurement Items	General Remark
1	The items on the instrument were straightforward to comprehend	
2	The items covered all the problem areas in e-commerce, tax compliance intention and technology optimism	
3	You would like the use of these items on the instrument for future assessments	
4	The items on the instrument lack essential questions regarding the study's constructs	
5	Some of the measurement items violate the respondents' privacy	
6	The style of language, meaning, clarity, consistency and interpretations of the items	
7	Any other related observation from the instrument and its items	

Appendix III: Face Validation Output

Please provide your expert opinion over the study's instrument presented to you under the following heading

S/N	General Questions on the Measurement Items	General Remark
1	The items on the instrument were straightforward to comprehend	*I agree with this statement*
2	The items covered all the problem areas in e-commerce, tax compliance intention and technology readiness	*They objectively address the areas of tax compliance*
3	You would like the use of these items on the instrument for future assessments	*Quite relevant for future assessment*
4	The items on the instrument lack essential questions regarding the study's constructs	*They focus mainly on the major issues in question.*
5	Some of the measurement items violate the respondents' privacy	*To some extent.*
6	The style of language, meaning, clarity, consistency and interpretations of the items	*They are straightforward, unambiguous and are okay*
7	Any other related observation from the instrument and its items	*Just to balance the nature of the questions.*

Figure 1: First Face Validation

Please provide your expert opinion over the study's instrument presented to you under the following heading

S/N	General Questions on the Measurement Items	General Remark
1	The items on the instrument were straightforward to comprehend	The measures are précised and cleared
2	The items covered all the problem areas in e-commerce, tax compliance intention and technology readiness	The items measured the variables of the study
3	You would like the use of these items on the instrument for future assessments	Yes
4	The items on the instrument lack essential questions regarding the study's constructs	No
5	Some of the measurement items violate the respondents' privacy	No
6	The style of language, meaning, clarity, consistency and interpretations of the items	The measurements are superb in term language, meaning, clarity, consistency and interpretations
7	Any other related observation from the instrument and its items	Is good to have negatively worded items under each construct to serve as a checker.

Figure 2: Second Face Validation

Please provide your expert opinion over the study's instrument presented to you under the following heading

S/N	General Questions on the Measurement Items	General Remark
1	The items on the instrument were straightforward to comprehend	The study items are good
2	The items covered all the problem areas in e-commerce, tax compliance intention and technology readiness	Yes, and they are ok
3	You would like the use of these items on the instrument for future assessments	Yes
4	The items on the instrument lack essential questions regarding the study's constructs	No, they don't lack anything for the current study
5	Some of the measurement items violate the respondents' privacy	No anyone so far in the instrument
6	The style of language, meaning, clarity, consistency and interpretations of the items	The items are easy to read and understand
7	Any other related observation from the instrument and its items	The instrument is good and can be used for the intent respondents

Figure 3: Third Face Validation