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Exploration and Practice of Digital Teaching of Customs Declaration and Inspection Practice Course Based on CTCL Paradigm Unified UTAUT Model

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Abstract:This paper aims to explore users' willingness to adopt the customs declaration and inspection platform, utilizing both the CTCL model and the UTAUT model. The study targets users of customs declaration and inspection platforms, with a sample size of 198 valid responses. PLS-SEM analysis was employed to investigate the factors influencing users' acceptance of the platform. The results reveal that culture positively impacts performance expectancy and social influence; technology significantly affects performance expectancy, effort expectancy, and facilitating conditions; content positively influences effort expectancy; and learner characteristics notably affect social influence. This research integrates the CTCL model into the UTAUT framework, extending our understanding of how users engage with customs clearance platforms. The findings suggest that system developers should focus on improving the quality of the platform to enhance user willingness to adopt it.

Keywords: CTCL; UTAUT; Customs Declaration and Inspection Platform

1. Introduction

The Belt and Road initiative has spurred significant changes in global trade, profoundly impacting the customs field. Alongside this, the development of "Internet Plus" technology has introduced new opportunities for digital transformation. However, challenges remain in the Customs Declaration and Inspection Practice course, such as complex course content, traditional teaching methods, and a lack of practical skills among students. These issues hinder the effectiveness of teaching and the development of necessary competencies in customs declaration and inspection.

To address these problems, this paper introduces the CTCL (Culture, Technology, Content, Learner) teaching paradigm. The CTCL model aims to improve the teaching process by incorporating technology to enhance learning and practical training. It provides a holistic framework, emphasizing course design, resource construction, the digital application of knowledge, and integrating theoretical learning with practical training. Despite its potential, digital teaching faces obstacles, including student acceptance, teacher digital literacy, and challenges in integrating resources into digital formats.

This study explores the application of digital teaching in the Customs Declaration and Inspection Practice course, using the CTCL model alongside the UTAUT (Unified Theory of Acceptance and Use of Technology) model. The CTCL model focuses on four key elements: culture, technology, content, and learner, while the UTAUT model explains technology adoption through performance expectancy, effort expectancy, social influence, and facilitating conditions. These frameworks help us understand students' willingness to use the customs declaration and inspection platform.

The teaching design of the course has traditionally been based on a national syllabus focused on knowledge delivery and certification. By incorporating the CTCL model, this paper analyzes the culture, technological support, course content, and learner engagement through surveys and interviews. The results inform a more flexible teaching model that integrates these dimensions to improve the quality of instruction.

The findings of this research are significant for improving the teaching of the "Customs Declaration and Inspection Practice" course,

with the aim of cultivating high-quality applied customs professionals. This study also supports the Ministry of Education's "National Standards for Teaching Quality of Undergraduate Programs in Higher Education," contributing to the digitalization of the curriculum and better preparing students for the challenges of global trade.

2. CTCL model

The research paradigm of technology for learning (CTCL) was proposed by a team led by Prof. Dong Yuqi in 2012, which combines the current situation and characteristics of China's local educational technology research with human-centeredness and learner development, and combines technology (T), learning content (C), and learner (L) under the vision of culture (C) (Wu, W., 2019). In CNKI, a cross-bank search was conducted with "CTCL" as the theme, and the selected time span was from January 2012 to June 2023, and a total of 25 documents were searched, all of which used the CTCL model as the theoretical basis, and most of them were research results of Prof. Dong Yuqi and his students, which were mainly empirical studies combining CTCL with specific disciplines, and there was only one master's degree study, and only one master's degree study. Empirical research, only one master's thesis studied the use of CTCL model for analysis during the course " Customs Declaration and Inspection Practice ", but no research was found on the use of CTCL paradigm combined with the UTAUT model to study the use of the Customs Declaration and Inspection Platform in the course "Customs Declaration and Inspection Practice".

3. UTAUT model

Venkatesh et al. (2003) created the UTAUT model, a unified model based on the concept of combining eight different theoretical models to explain the factors influencing the acceptance and use of information and communication technologies (ICTs) in the workplace (Yang et al. 2021) .In the study of customs clearance usage, researchers used the UTAUT model in different contexts such as performance expectancy, effort expectancy, facilitating conditions, and social influence. However, in the exploration of the use of educational technology, a review of the use of the UTAUT model in the field of online education states that 20 out of 30 significant papers analyzed significantly used the UTAUT model as a theoretical foundation, where discussions of behavioural intention, facilitating conditions, and performance expectancy dominated, and that UTAUT thus provides an invaluable tool that enables university policy makers, faculty, and designers to understand the factors that drive the acceptance of an e-learning system and thus facilitate its adoption by students (Abbad M, 2021) . Due to its novelty in the field of user acceptance research, its excellence and its relatively small presence in the existing literature on e-learning. (Šumak, et al. 2010).

4. Modeling and Research Assumptions

This study also attempts to explore the impact of the CTCL model and the two parts of the UTAUT model on the acceptance of using the Customs Declaration and Inspection Platform, therefore, this study does not include students who do not use the platform to study the Customs Declaration and Inspection Practices course. With reference to the hypotheses presented in the previous section, the "CTCL-UTAUT" research model is shown in Figure 1.

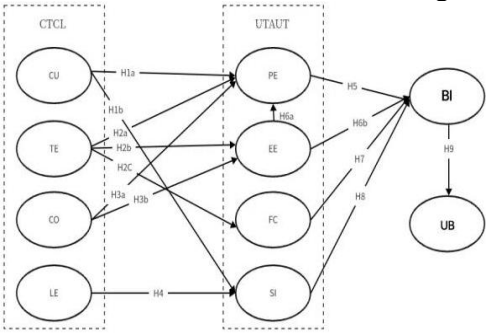

Figure 1. Theoretical Model - CTCL - UTAUT

4.1 Culture.

Culture is defined as a set of values, norms, professional conduct, and practical experiences centered around customs declaration and inspection activities, including management, skill development, and ethics (Wu Wei, 2019). Understanding these cultural elements is vital for users engaging with customs declaration platforms. Thus, we hypothesize:

H1. "Culture" positively influences performance expectancy (a) and social influence (b) in the UTAUT model.

4.2 Technology.

Technology, as defined by Meifeng Liu (2003),

involves both material and immaterial forms. In the CTCL model, it refers to the use of technology to present knowledge and skills related to customs declaration, promoting cognitive development and practical abilities (Xie et al., 2019). If the platform supports comprehensive processes, clear instructions, and realistic simulations, users will find it easier to learn and use (Wu W, 2019; Ting Yang, 2021). Therefore, we hypothesize:

H2. "Technology" positively impacts performance expectancy (a), effort expectancy (b), and facilitating conditions (c) in the UTAUT model.

4.3 Content.

CTCL emphasizes the interdisciplinary nature of learning content (Dong Yuqi et al., 2012), focusing on the intersection of disciplines. The platform's content, including templates, practice scenarios, and up-to-date policies, influences students' willingness to engage. More comprehensive and relevant content increases platform use. Therefore, we hypothesize:

H3. "Content" positively affects performance expectancy (a) and effort expectancy (b) in the UTAUT model.

4.4 Learner.

The CTCL model views learners as part of a social learning community (Dong Yuqi et al., 2012). Students' initial understanding of customs clearance and their motivation to learn affect their engagement with the platform. Teachers' ability to explain updated customs policies also plays a role. Therefore, we hypothesize:

H4. "Learners" positively influence social influence in the UTAUT model.

4.5 Performance Expectancy.

Performance expectancy is the belief that using a system will enhance job performance (Raman et al., 2018). In this context, students' perception of how well the platform aids in mastering customs knowledge directly impacts their willingness to use it. Therefore, we hypothesize:

H5. Performance expectancy positively affects behavioral intention.

4.6 Effort Expectancy.

Effort expectancy refers to the perceived ease of use of a technology (Venkatesh et al., 2003). In digital teaching, students' perception of convenience influences their willingness to adopt the platform. Thus, we hypothesize:

H6. Effort expectancy positively affects performance expectancy (a) and behavioral intention (b).

4.7 Facilitating Conditions.

Facilitating conditions are the perceived organizational and technological infrastructure to support system use (Chang A., 2012). Effective communication with teachers, peer collaboration, and system support enhance students' willingness to learn. Therefore, we hypothesize:

H7. Facilitating conditions positively affect behavioral intention.

4.8 Social Influence.

Social influence refers to the impact of peers and instructors on technology adoption (Venkatesh et al., 2003). Positive feedback and peer collaboration play significant roles in encouraging platform use, especially in digital learning environments (Lai, P. et al., 2020). Therefore, we hypothesize:

H8. Social influence positively affects behavioral intention.

4.9 Behavioral Intention.

Behavioral intention reflects the user's intent to accept and use technology. It is closely linked to the technology's ease of use, functionality, and support services, directly impacting engagement and learning outcomes (Abbad, M.M.M., 2021). Thus, we hypothesize:

H9. Behavioral intention positively affects use behavior.

This study also attempts to explore the impact of the CTCL model and the two parts of the UTAUT model on the acceptance of using the Customs Declaration and Inspection Platform, therefore, this study does not include students who do not use the platform to study the Customs Declaration and Inspection Practices course. With reference to the hypotheses presented in the previous section, the "CTCL-UTAUT" research model is shown in Figure 1.

5. Method

5.1 Research design

The design of the study was mainly in the form

of questionnaire design. The questionnaire is divided into two parts, the first part is personal information including grade, gender, and major. The second part is a questionnaire on students' continuous use behavior, which includes ten questions related to measuring the research model, namely culture, technology, content, learner, performance expectancy, effort expectancy, facilitating conditions, social influence, behavioural intention, and use behaviour. This setup helps to reduce the amount of common methodological bias (Chang et al., 2010). Respondents were asked to answer questions based on their recent use of the Customs and Inspection Practical Training Platform for learning customs and inspection related knowledge.

5.2 Data analysis

This online survey was distributed to students through the Questionnaire Star website from July 2024 through September 2024, during which time a total of 198 samples were collected. A total of 0 sets of samples were manually removed because the questions were rated similarly or confusingly. This step was intended to ensure that questionnaire fillers provided correct answers for all measurable items. Finally, 198 valid samples were obtained. The research model has 30 questions and this sample size is appropriate as it is a 10:1 ratio for structural equation modeling analysis (Hair et al., 2010) . Table a1 in the appendix shows the sample characteristics.

5.3 Reliability and Validity

The following statistical analyses were performed using the program SmartPLS version 4.1.3.PLS has proven to be a very powerful and versatile data analysis tool widely used in many areas of research and industrial applications (Rosipal et al., 2005). Table1 is the values of each measure for measures such as means, standard deviations,Cronbach's alpha, PLS loadings, AVE and CR. All loading factors for each measure exceeded 0.7, FC1 loaded on FC at 0.655, the factor loadings were not high but still strongly correlated, so they reached the recommended level. All Cronbach's alpha values ranged from 0.843 to 0.936. Every average vaHance extracted (AVE) value is higher than 0.7 and most of them are greater than 0.8, while construct reliability (CR) rho_a reliability coefficients have values greater than 0.8. These results indicate that the results measured using this method have high reliability and validity.

Table 1. Construct Reliability and Validity

	Mean	S.D.	Cronbach's alpha	PLS loadings	AVE	CR
CU			0.892		0.823	0.933
CU1	4.101	0.660		0.896		
CU2	4.186	0.637		0.912		
CU3	4.095	0.665		0.914		
TE			0.872		0.796	0.921
TE1	4.070	0.708		0.903		
TE2	4.121	0.702		0.894		
TE3	4.131	0.700		0.881		
CO			0.872		0.796	0.921
CO1	4.035	0.736		0.920		
CO2	4.141	0.660		0.878		
CO3	3.853	0.851		0.878		
LE			0.843		0.761	0.905
LE1	4.005	0.783		0.855		
LE2	4.065	0.720		0.894		
LE3	4.035	0.808		0.868		
PE			0.905		0.841	0.941
PE1	4.020	0.753		0.896		
PE2	4.015	0.743		0.926		
PE3	4.000	0.712		0.929		
EE			0.895		0.826	0.934
EE1	4.035	0.686		0.915		
EE2	4.085	0.717		0.921		
EE3	4.000	0.733		0.890		
FC			0.711		0.627	0.833
FC1	3.767	0.797		0.655		
FC2	4.030	0.760		0.859		
FC3	3.459	1.115		0.845		
SI			0.883		0.810	0.927
SI1	3.949	0.752		0.895		
SI2	3.838	0.814		0.918		
SI3	3.914	0.817		0.886		
BI			0.936		0.887	0.959
BI1	3.888	0.817		0.941		
BI2	3.909	0.800		0.946		
BI3	3.828	0.878		0.937		
UB			0.921		0.864	0.950
UB1	3.904	0.828		0.934		
UB2	3.929	0.827		0.943		
UB3	3.939	0.758		0.911		

(Note: AVE = average variance extracted; CR = construct reliability)

Tables 2 show the results calculated under the Fornell-Larcker Criterion (Fornell-Larcker Criterion, 1980) . The square root of the AVE of each construct is greater than the correlation of its construct. Overall, the measurement model is acceptable for discriminant validity

and supports discriminant validity between constructs. A rigorous statistical analysis process including data preprocessing, variable screening, model estimation, and result validation was used in this study to ensure reliability and validity of the analyzed results.

Table 2. Correlation and Square Root of AVE

	BI	CO	CU	EE	FC	LE	PE	SI	TE	UB
BI	0.94									
CO	0.69	0.89								
CU	0.66	0.75	0.90							
EE	0.79	0.78	0.73	0.90						
FC	0.77	0.67	0.65	0.78	0.79					
LE	0.70	0.79	0.73	0.78	0.71	0.87				
PE	0.81	0.80	0.75	0.86	0.76	0.81	0.91			
SI	0.87	0.73	0.68	0.83	0.83	0.75	0.82	0.90		
TE	0.68	0.86	0.76	0.77	0.62	0.78	0.79	0.71	0.89	
UB	0.88	0.68	0.64	0.83	0.78	0.72	0.81	0.85	0.68	0.92

5.4 Results

Significance was assessed according to PLS. Figures 2. show the results of the PLS analysis: the R"-value for behavioural intention is 0.792 and the R"-value for use behaviour is 0.774, which can be described as "substantial". And the overall loading index are (>0.845), combined reliability (>0.711) In short, the four acceptance factors are significantly correlated with behavioural intention, and behavioural intention is significantly correlated with use behaviour, indicating that H5 to H9 are supported. The R" values for performance expectancy, effort expectancy, facilitating conditions, and social influence were 0.802, 0.655, 0.392, and 0.608, respectively. culture on performance expectancy (a=0.117,t=2.071) and social influence (a=0.272, t=3.493), indicated support for H1a and H1b. technology on performance expectancy (a = 0.161, t = 1.757), effort expectancy (a = 0.369, t = 4.387), and facilitating conditions (a = 0.626, t = 14.694), indicating support for H2a, H2b, and H2c. content vs. performance expectancy (a = 0.154, t = 1.371) and effort expectancy (a = 0.468, t = 5.699), indicating no support for H3a and support for H3b. learner to social influence (a=0.558, t=7.274), indicating support for H4. the variance inflation factor (VIF) values of all the dependent variables were less than 4.296, therefore, covariance was not an issue in this study..

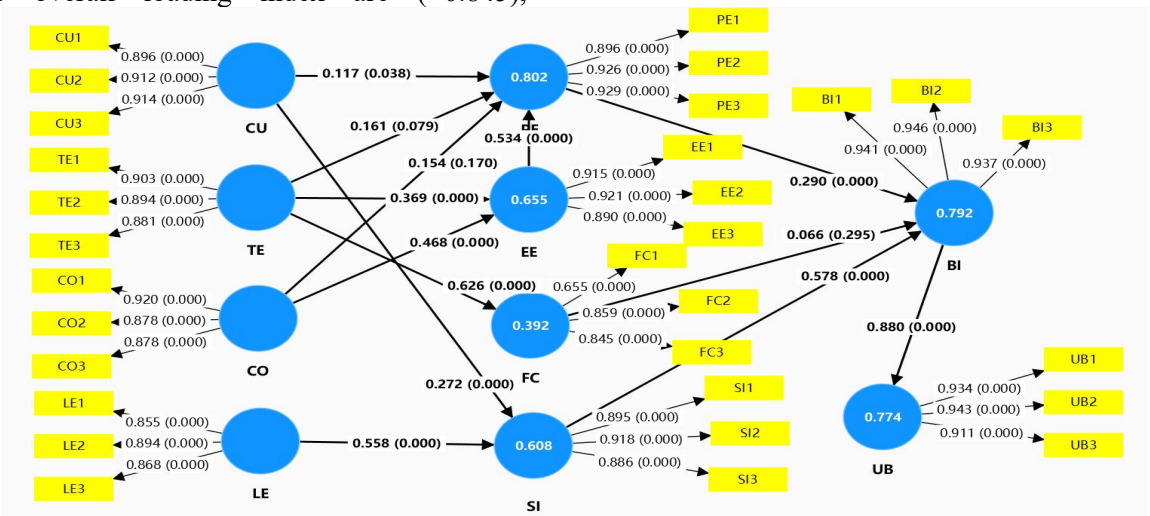

Figure 2. PLS Analysis Results

6. Discussion

6.1 Conclusion

Culture influences behavioral intention indirectly through performance expectancy and social influence. Technology positively impacts performance expectancy, effort expectancy, and facilitating conditions. Content also enhances performance and effort expectancy. Learner characteristics may either positively or negatively affect behavioral intention and use behavior. Performance expectancy, effort expectancy, and facilitating conditions all have positive effects on behavioral intention or use behavior, depending on the technology's ease of use. Social influence also positively affects these outcomes.

6.2 Suggestions

6.2.1 Strengthen Cultural Representation and Optimize Technical Content

Culture and technology significantly impact

users' behavioral intention and platform usage by affecting performance expectancy. To improve platform acceptance, cultural elements related to professional management, skill learning, and ethics should be emphasized. Additionally, optimizing platform technology to ensure smooth functionality and comprehensive features will enhance users' performance and effort expectancy, ultimately boosting platform engagement.

6.2.2 Enhance Technical Ease of Use and Increase Effort Expectancy

Improving ease of use and strengthening effort expectancy are critical to increasing users' willingness to adopt the platform. The platform interface should be streamlined for easy navigation, and its interactivity should be enhanced to provide real-time feedback. Offering detailed guides and tutorials will help users master the platform quickly, while regular updates will ensure the platform meets user needs. These steps will improve both effort expectancy and performance expectancy, driving greater platform use.

6.2.3 Strengthen Technical Support and Foster a Positive Learning Environment

Facilitating conditions, including technical support, play a key role in enhancing behavioral intention and use behavior. The platform should cover all customs declaration processes with clear instructions and realistic simulations. Ensuring compatibility across devices will allow for anytime, anywhere learning, while aligning the course content with industry needs will improve its practical value, encouraging more widespread use.

6.2.4 Strengthen Cultural Guidance and Social Influence

Culture positively influences behavioral intention by shaping social influence. The platform should highlight the professional culture of customs declaration and inspection to strengthen users' social identity with the field. Collaborating with industry associations and academic institutions will boost the platform's credibility and encourage more users to engage with it. Media exposure and successful case dissemination will further enhance its social influence.

6.3 Implications and Limitations

The study's limited sample size and focus on a single institution restrict the generalizability of the findings. Future research should expand the study population and explore other learner types and contexts for a more comprehensive understanding. Additionally, the analysis of learners and culture could be deepened. The CTCL-UTAUT model needs further validation in long-term teaching practices, with an emphasis on continuous improvement through learner-centered feedback.

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