ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

Empirical Research on Innovation Training of Applied Talents in Supply Chain Operation and Management Under the Background of Digital Economy in The Tianjin Area

Yi Tian, Xinyi Zhang and Yuxin Ye*

Tianjin University of Technology and Education, Tianjin 300222, China

*Corresponding author

Abstract

Under the background of the digital economy, the perceived value of students' learning of supply chain management has gradually become an important influencing factor for the cultivation of applied talents in supply chain operation and management. Based on the theoretical research of the digital economy and the current industry development, this study fully investigates undergraduate supply chain operation and management-related majors in Tianjin. Furthermore, it analyzes the current basic situation of supply chain applied talent cultivation and discusses the existing problems. The study found that potential variables such as teaching content, teaching facility, enterprise demand, university-enterprise cooperation, digital supply chain policy support, supply chain operation, and management talent policy positively affect the satisfaction of applied talent cultivation. The satisfaction of talent cultivation plays a mediating role in the impact of various potential variables on students' willingness to learn. Based on the empirical research analysis results in this study, follows are proposed: universities should strictly standardize teaching content and optimize teaching facilities to increase students' willingness to learn; enterprises need to strengthen the survey, statistical induction, and resource provision of talent demand; the government can formulate relevant policies to promote the digital transformation of enterprises and improve talent cultivation, introduction and protection at all levels.

Keywords

Digital economy; Supply chain operation and management; Applied talent cultivation; Students' willingness to learn.

1. Introduction

In 2022, General Secretary Xi Jinping emphasized the need to further strengthen and optimize the development of China's digital economy. According to the "14th Five-Year Plan for the Development of Digital Economy", issued by the National Development and Reform Commission of the People's Republic of China, the optimization and advancement of China's digital economy aims to provide strong support for the construction of digital China. With the unique advantages of digital technology gradually highlighted, and with the development of China's logistics industry, the digital supply chain system is becoming more refined[1]. In this context, the innovative role of supply chain management in the training of applied talents is becoming more and more important, and it is particularly urgent to improve the construction standards, innovation mechanism, and achievement application system of supply chain management applied talents training innovation mechanism. The widespread application of emerging technologies such as the Internet of Things, big data, 5G, artificial intelligence (Al), and blockchain in the field of higher education may not only become a key force to break through the bottleneck of higher education talent training but also become a new driving force

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

to promote national construction[2]. Furthermore, a training model that integrates teaching, scientific research, and practice, led by ideological and political education, is emerging[3]. The linking mechanism among government, universities, and enterprises plays an increasingly important role in the training of applied talents[4].

Since the 20th National Congress of the Communist Party of China (CPC), the Central Committee and the State Council have placed significant emphasis on the crucial role of industry-education integration in talent development. They have actively promoted the integration of industry and education and cooperations between universities and enterprise through comprehensive policy initiatives and financial supports. Specific measures include the construction of industry-education integration enterprises, industry-education consortiums and communities, the industrial colleges within undergraduate institutions, and the formation of dual-qualified in vocational colleges. The training of application-oriented talents plays an important role in promoting the high-quality development of the digital economy. At present, the scale of China's digital economy continues to expand. According to the Research Report on the Development of China's Digital Economy (2023), the scale of China's digital economy will exceed 50 trillion yuan in 2022, and the digital economy will account for 41.5% of GDP, becoming an important engine for economy[5]. The digital supply chain, as an important guarantee for the development of the digital economy, helps to promote the innovation and value-added capacity of the supply chain to a certain extent. The application of digitalization and related technologies has promoted the innovation of enterprise supply chain management, which is not only reflected in the trend of intelligent processes but also reflected in the increasing reliance on data analysis for decision-making in all links of the supply chain[6]. The development of the digital supply chain, digital characteristic industrial clusters, digital transactions, and logistics parks, as well as the development of digital inclusive supply chain finance, will usher in a period of accelerated development, and the demand for supply chain applied talents will also increase.

Currently, the academic research on the training of applied talents in logistics or supply chain operation management mainly focuses on the construction of training modes and the development of teaching content. However, the research on learning satisfaction and willingness to engage in relevant talent training is insufficient. In the digital era, the traditional talent training modes in colleges and universities can no longer meet the needs of applied talent training of supply chain operation management under the background of the digital economy. Therefore, this study aims to promote the training of applied talents in the supply chain for the healthy development of related industries, and improve employment experience of students and employment situation of enterprises, which has important practical significance.

2. Literature Review

The rapid development of digital technology and the vigorous rise of e-commerce provide substantial technical and commercial support for theoretical research and management practice in supply chain operations and managements. Supply chain management emphasizes the whole process of collaboration from suppliers, manufacturers, and distributors to final consumers, to facilitate the seamless flow of logistics, information flow, and capital flow, and establish an efficient and reliable competitive advantage[7]. During rapid realization of digital advantages intelligence in enterprises, various kinds of digital intelligent equipment improve the productivity and competitiveness of enterprises by optimizing supply chain efficiency. As the amount of data generated in the practice of end-to-end supply chain management shows exponential growth, the generation, collection, organization, and analysis of big data provide strong support for solving the problems of supply chain management [8]. With the help of digital transformation, the professional division of labor within the supply chain has been deepened, and the sharing of information and knowledge has also greatly improved the support of digital

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

intelligence technology. The traditional linear vertical supply chain has gradually evolved into a more complex, dynamic, virtual, and real supply chain network. The scope of supply chain collaboration is no longer limited to the internal departments of the enterprise but extended to the collaborative network composed of upstream and downstream enterprises and specific partners[9]. Although the deep integration of physical space and digital space brings new challenges to supply chain management, it also creates more opportunities through new technologies, perspectives, models, and other aspects, thereby enhancing the flexibility of the supply chain network. Therefore, under the background of the digital economy, the training of applied talents in the supply chain is particularly crucial.

At present, the relevant literature mainly explores the influencing mechanism of the training effect of applied talents in supply chain operation management from two perspectives. First of all, the teaching process with university teaching as the core covers teachers' education investment, teaching mode, students' learning state, learning preparation, and teaching effect[7]. Secondly, it focuses on the three levels of internal factors, the coupling between the two parties, and the external environment of the integration of industry and education. The training of applied talents for supply chain operation management also involves many factors such as universities, enterprises, and governments. In the reform of talent training in colleges and universities, the training process that affects students' employability is also one of the key factors. Therefore, this study focuses on the process factors of talent training in colleges and universities. Previous empirical studies have shown that university courses are directly related to graduates' employability in terms of general ability, and professional knowledge[9]. In terms of industry-education integration, some scholars can analyze the main factors restricting cooperation from the perspective of industry-university-research cooperation models, such as cooperation mechanism and system, cooperation willingness, interest distribution, and other issues[10]. Combined with the characteristics of industry-education integration and referring to relevant research conclusions, the atmosphere of industry-education integration, high-quality resources, cooperation experience, and policy support are considered to promote the integration of industry-education in application-oriented undergraduate colleges, improve the satisfaction in the process of talent training, and thus enhance students learning willingness and positive employment behavior[11].

Students' willingness to learn can reflect their satisfaction with the content, mode, or platform of training and the prospect of professional development. According to literature research, the higher the degree of satisfaction, the more willing students are to learn professional knowledge and skills. At present, most of the research on students' learning willingness focuses on the field of general education[14], but some scholars believe that new technologies such as "artificial intelligence" are an important driving force to promote the upgrading and iteration of the labor force, which may release huge productivity but also cause technological unemployment[15]. However, whether it is the study on the willingness to learn general knowledge or the demand for professional skills brought by new technology, the existing literature still lacks a comprehensive analysis of the overall teaching conditions of colleges and universities, the new demand for industry development, and the government-oriented policies[16]. Therefore, this study constructs a research model of the influence of multiple factors on the training effect of applied talents in supply chain operation management and students' learning willingness, aiming to analyze the influence of three characteristic factors of universities, enterprises, and government on students' learning willingness in Tianjin, and verify the mediating effect of student satisfaction.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

3. Model Construction and Hypothesis

3.1. Model design

The technology acceptance and use integration model (UTAUT) covers the performance expectations, the efforts of expectation, social influence, and convenient conditions of the four major dimensions. In addition, the UTAUT model also included moderating variables[17]. This model in predicting the user the use of innovative technologies and behavior showed remarkable accuracy, predicting rate reaching 70%, becoming the empirical research analysis of the factors influencing the user innovation technology acceptance and use of a common theoretical model[18]. Based on the UTAUT model framework, this study builds the supply chain operation management talent training various characteristics of students' willingness to learn and study the model of personnel training effects. From universities, enterprises and government three dimensions respectively summarized characteristics of supply chain management applied talents training. Specifically, we will explore how these characteristics influence the students' willingness to learn, and further inspect the intermediary effect of student satisfaction in the process.

3.1.1. University dimension

University dimensions are considered from the following three aspects: first, the university offers supply chain operations and management-related courses, experience, inquiry, and discussion-based teaching methods, designed to stimulate students' active participation. During this process, teachers provide targeted feedback and guidance to students in terms of their learning attitude and behavior during their participation to promote the development[19]. Second, the university actively works with the enterprise to establish relations of cooperation, and provides students with diverse learning opportunities, including laboratory operations, field research, and project practice, etc., these practical activities not only help students apply theoretical knowledge to practical situations, but also can enhance their practical ability and professional quality; Finally, the university undertakes industry certificate training, and conducts innovative research to ensure that the teaching content keeps up with the forefront of industry development so that students can graduate with the latest professional knowledge and skills, and better adapt to the needs of the workplace.

3.1.2. The enterprise dimension

The enterprise dimension is discussed from the following three aspects: Firstly, enterprises actively participate in the design and update of course content and ensure that the talents trained meet the needs of the industry by providing practical application cases and industry trends. This close cooperation between enterprises and universities helps students understand the current situation and development trend of the industry so that they can get a learning experience closer to the actual work; Secondly, enterprises provide students with professional mentors' guidance, covering technical training, project guidance and career development suggestions. Professional mentors can not only impart practical experience, but also help students clarify their personal career path and improve their vocational skills and employment competitiveness; Finally, enterprises and universities promote industry certification and training and support the graduates' employment, and through active participation in campus recruitment activities, enterprises provide internship and job opportunities, not only to enhance the student's employment prospects, but also for their transportation qualified talents.

3.1.3. Government dimension

Government dimension is analyzed from the following three aspects: first of all, the government formulated related policies and regulations, in promoting the development of education and training in the field of supply chain at the same time, promote enterprise digital management of supply chain. Through policy guidance and support the government can provide the

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

necessary law and system guarantee for supply chain management education, and meanwhile encourage enterprises to adopt advanced digital technology to promote the management level; Second, the government should play a leading role in promoting the depth of the fusion between production and the participate of enterprises in the talent training. The government can construct platform for cooperation, organization and coordination mechanism, to ensure the education contents and combined closely with the industry demand and produce more applied talents in line with the market demand; finally, the government should provide financial support to reduce the economic burden of innovative employment, do a good job in security work. Through subsidies, tax incentives and other measures, the government can reduce the cost of enterprises and individuals in the process of innovation and entrepreneurship, and provide the necessary social security and services, creating a good environment for the growth and development of talents.

3.2. Research hypothesis

3.2.1. The influence hypothesis of university dimension

As the execution subject of talent training, university plays a crucial role in the training of applied talents in supply chain management. Therefore, the university teaching process is an important factor affecting the effects of supply chain personnel training. According to the existing research, the university teaching dimension is divided into two aspects: teaching content and teaching facilities. The satisfaction in teaching content reflects if the curriculum matches the actual business demand or not; The satisfaction of teaching facilities is related to the comfort of the learning environment and the effect of practical learning. Based on this, the following hypotheses were put forward:

H1a teaching content significantly positive influence on satisfaction

H1b teaching content significantly affects the willingness to learn

H2a teaching facilities significantly positive influence on satisfaction

H2b teaching facilities significantly affect the willingness to learn

3.2.2. Hypothesis of the impact of the enterprise dimension

The enterprise dimensions can be summarized with two main factors: one is the enterprise's need to meet the needs of students' learning; the other is two-way or other forms of university and enterprise cooperation content and mode. The satisfaction of students with the enterprises in terms of their needs is directly associated with their willingness to learn, reflecting if the course content is in line with the actual work content needs or not. And university-enterprise cooperation variable mainly is employed to study cooperation pattern and effect on the student ability promotion. Based on this, following hypotheses were put forward:

H3a Corporate demand significantly positively affects satisfaction

H3b enterprise needs significantly positively affect learning intention

H4a university-enterprise cooperation has a significantly positive impact on satisfaction

H4b university-enterprise cooperation significantly positively affects learning Intention

3.2.3. Impact hypothesis of government dimension

In the government dimension, the government's active support in digital support and talent policy helps to improve students' satisfaction with the training plan, thus stimulating students' willingness to learn. Specifically, students' identification with the government support measures will substantially help for their future career development, and then affect their willingness to learn the major. Therefore, based on this, the following hypotheses were put forward:

H5a digital support has a significantly positive impact on satisfaction

H5b digital support has a significantly positive impact on learning intention

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

H6a talent policy support significantly positively affects satisfaction

H6b talent policy support significantly positively affects learning intention

3.2.4. Influence hypothesis of mediating variables

Students' satisfaction with university teaching content, university teaching facilities, enterprise demand, enterprise-university-enterprise cooperation, government digital support, government talent policy support, and other aspects may directly affect the learning willingness, and then affect the effect of supply chain operation management applied talent training. Specifically, students' satisfaction with the teaching content reflects their recognition of the needs of the major and industry. A good curriculum can enhance students' confidence in their future careers. High-quality teaching facilities can meet the needs of practical learning and help improve students' practical ability and professional skills. The satisfaction of students' learning needs by enterprises is closely related to students' views on employment prospects. High-quality enterprise participation can increase students' employment opportunities. The satisfaction of enterprises with university-enterprise cooperation projects is related to the degree to which students can obtain practical opportunities. Effective cooperation mode can provide students with more practical experience. The satisfaction of government digital support and talent policy support may directly affect the improvement of students' digital intelligence literacy, to enhance their competitiveness in the future workplace. Therefore, talent training satisfaction is not only the source of students' learning motivation but also an important factor affecting the training of high-quality applied talents for supply chain operation management. Based on this, the following hypotheses are put forward:

H7 Satisfaction significantly positively affects learning intention

H8 Satisfaction is mediated by teaching content and learning intention

H9 Satisfaction was mediated by teaching facilities and learning intention

H10 Satisfaction was mediated by enterprise demand and learning intention

H11 Satisfaction intermediary in university-enterprise cooperation and willingness to learn

H12 Satisfaction was mediated by digital support and learning intention

H13 Satisfaction intermediary in talent policy support and willingness to learn

4. Empirical Analysis

4.1. The questionnaire design

The designed questionnaire is divided into four parts: the first part is the description of the questionnaire, which led respondents to fill in the questionnaire. The second part is respondents' basic situation investigation, including gender, in colleges and universities, studying professionals, and grades. The third part is the measurement of latent variables of students' personality attitudes toward learning supply chain operation management. For the measurement of university-dimension teaching content variables, this study refers to the relevant research suggestions of Ye Suwen and Chen Xiaohong et al. [20][21], and for the measurement of teaching facilities variables this study refers to the research results of Shao Lingzhi et al. [22]. The measurement of job demand variables in the enterprise dimension is formed through the measurement of enterprise mentors, real projects, and enterprise consulting services. The fourth part is the students' learning satisfaction and learning willingness to behavioral intention measures, namely, satisfaction and willingness to learn. The study willingness of students refers to Bhattacherjee-related research[23]. The five-point Likert scale method was employed, where one end represents "not at all in agreement," while the other end represents "very much in agreement" with a score of 5. A higher score indicates a higher rate of agreement. After initial verification and a small-scale trial, the questionnaire was adjusted based on feedback to refine the item set.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

4.2. Data sources and sample statistics

This study was performed on undergraduate students in the Tianjin region majored in logistics supply chain management or other related from November 28, 2023 to December 18, using the questionnaire star platform distribution network questionnaire. Students were invited from six universities in the Tianjin region (including Tianjin University of Technology and Education, Tianjin University, Tianjin University of Commerce, Tianjin Normal University, Tianjin University of Finance and Economics) and Tianjin University of Science and Technology of the Business, engineering specialty (undergraduate course the first and second batch. Overall student satisfaction was normally distributed following the actual, which indicates that the questionnaire survey data have certain universality and representativeness, excluding answer options consistent or regularly completed questionnaire samples, a total of 433 effective questionnaires were taken back. The descriptive statistics are shown in Table 1. Among the respondents, 33.3% were male and 66.7% were female. All grades and universities' survey sample sizes are more balanced, suggesting that the sample representativeness; E-commerce, logistics management direction, and wisdom (including aviation logistics supply chain management) are the main research objects, accounting for 79.9%.

Table 1. Sample characteristic distribution describes (1)

Variable	Options	Frequency	The percentage
Gender	male	144	33.3%
	female	289	66.7%
Grade level	Freshman year	125	28.9%
	A sophomore	88	20.3%
	Junior year	153	35.3%
	Senior	67	15.5%

Table 1. Distribution Description of Sample Characteristics (2) (sorted by proportion)

The university	Proportions	Professional	Frequency	The proportion
Tianjin University of Technology and Education	24.8%	E-commerce	67	62.6%
		Logistics management (including aviation logistics direction)	40	37.4%
Tianjin University	21.0%	Logistics supply chain operation management (wisdom)	51	56.0%
		E-commerce	40	44.0%
Tianjin University of Commerce	15.0%	Financial management	25	38.5%
		E-commerce	25	38.5%
		Logistics management	15	23.0%
Tianjin Normal University	14.1%	Internet of Things Engineering	27	44.3%
		Software Engineering	15	24.6%
		Network engineering	12	19.7%
		other	7	11.4%
Tianjin University of Finance and Economics	13.6%	Logistics management	49	83.1%
		Logistics and supply chain management	8	13.6%
		Business Administration	2	3.3%
Tianjin University of Science and Technology	11.5%	Logistics engineering	30	60.0%
		Logistics management	20	40.0%

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

4.3. Reliability and validity test

SPSS27.0 was used to test the validity and reliability of the collected valid sample data. The detailed results are shown in Table 2. The results showed that the α reliability coefficient of the overall scale was 0.973, and the reliability coefficient of all variables was greater than 0.7, indicating that the questionnaire data had ideal reliability and consistency. The KMO value of the overall scale was 0.967, which was greater than 0.6. Therefore, the data could be used for exploratory factor analysis. Analysis of each item factor loading, all of the factor loading were greater than 0.5, the cumulative variance contribution rate is 71.00%. This result shows that in the field of social sciences, the variable measurement indicators used in this study have good validity[24][24].

Table 2. The reliability validity analysis results

Potential Variables	Measuring project	Measurement items	Factor loading	Cronbach Alpha	KMO
Teaching content (TC)	TC1	The teaching content meets the needs of logistics or supply chain management personnel training	0.743	0.93	0.967
	TC2	Reasonable logistics or supply chain management-related courses teaching the content of the digital economy	0.762		
	TC3	Offer practical training courses related to logistics or supply chain management	0.696		
	TC4	Actively conduct competitions related to logistics or supply chain management	0.726		
	TC5	Teaching knowledge of digital technology meets the demand for employment	0.848		
	TC6	To carry out the vocational qualification certificate examination training can meet the demand	0.786		
	TC7	Video lesson micro construction can meet the demand for logistics and supply chain management personnel training	0.89		
	TC8	Major ideological construction to promote logistics or supply chain management practice in teaching and scientific research	0.859		
Teaching facilities (TF)	TF1	Teaching hardware facilities meet the demand of logistics and supply chain management professional learning	0.804	0.877	
	TF2	Provide logistics and supply chain management comprehensive and complete teaching software	0.844		
	TF3	Virtual logistics or supply chain management, and intelligence construction meet the demand of the teaching of the classroom	0.871		
Enterprises Demand (JD)	JD1	Enterprise tutor teaching meets the demand for supply chain management personnel training	0.856	0.924	
	JD2	University-enterprise cooperation in real project output, management, and evaluation of processes meets the demand for supply chain management personnel training	0.925		
	JD3	Corporate advisory services meet the demand for supply chain management personnel training	0.914		
University-enterprise cooperation (CB)	CB1	Enterprise cooperation pattern diversity associated with your university logistics or supply chain	0.921	0.922	
	CB2	Enterprises to cooperate with your university logistics or supply chain improve students' various aspects of ability	0.929		

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

Digital supply chain support (DP)	DP1	Understand the new supply chain policies issued by the government in the context of digital economy	0.774	0.903	
	DP2	Sufficient funds allowance of the digital economy under the background of supply chain	0.826		
	DP3	The digital economy under the background of supply chain industry development impetus	0.869		
	DP4	The digital economy under the background of supply chain supports innovative undertaking	0.903		
Talent policy support (TP)	TP1	The government provides a complete supply chain management talent service guarantee policy	0.926	0.948	
	TP2	Strong publicity of supply chain management personnel training policy	0.91		
	TP3	Provide enough money to support supply chain management personnel employment tax breaks	0.917		
	TP4	Effective coordination between the two sides' interests to play a leading role	0.875		
Satisfaction with talent training (ST)	ST1	The quality of university teaching satisfaction	0.827	0.892	0.739
	ST2	Satisfaction of university-enterprise cooperation training content	0.904		
	ST3	Satisfaction with government supply chain-related talent policies	0.846		
Students' Willingness to learn (SW)	SW1	Understand the forefront of the industry information	0.871	0.895	0.751
	SW2	Participate in related events or competitions	0.858		
	SW3	Work in a related industry	0.854		
General Questionnaire	-			0.973	-

5. Model test

5.1. Correlation analysis and path testing

The correlation analysis was used to verify the hypotheses of the model, and the correlation analysis was carried out on the variables involved in the research model for the influence of students' learning willingness. The results are shown in Table 3 and Table 4. It can be seen that the factors of the dimensions of university, enterprise, and government are significant at the level of 5% with students' learning satisfaction and students' learning willingness.

Table 3. Pearson correlation analysis results among variables

	Schoo1 dimension	Corporate dimension	Dimensions of government	Satisfaction	Willingness to learn
Schoo1 dimension	1				
Corporate dimension	.879**	1			
Dimensions of government	.728**	.724**	1		
Satisfaction	.701**	.715**	.634**	1	
Willingness to learn	.451**	.462**	.457**	.588**	1

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

Table 4. Results of Pearson correlation analysis among factors

	Teaching content	Teaching facilities	Enterprise needs	University - enterprise collaboration	Digital support	Talent Cultivate Support	Satisfaction	Learning willingness	Scale overall
Teaching content	1								
Teaching facilities	.820**	1							
Enterprise needs	.847**	.829**	1						
University - enterprise collaboration	.808**	.788**	.900**	1					
Digital support	.692**	.687**	.700**	.701**	1				
Talent Cultivate Support	.659**	.676**	.660**	.674**	.868**	1			
Satisfaction	.688**	.644**	.700**	.693**	.619**	.607**	1		
Learning willingness	.440**	.418**	.460**	.438**	.459**	.426**	.588**	1	
Scale overall	.913**	.872**	.903**	.881**	.854**	.831**	.814**	.620**	1

Note:** indicates p<0.0l

The path assumed by the model was verified using SmartPLS 4.0. The resulting data are shown in Table 5, and the path diagram is shown in Figure 1. It can be seen from the table that teaching content, teaching facilities, university-enterprise cooperation, and talent policy support have a positive impact on satisfaction, but not on students' willingness to learn. Other factors have a positive impact on satisfaction and students' willingness to learn.

Table 5. Model assumes that the path test results

Research hypothesis	Path relationship	Standardized path coefficient	T	P	Test results
H1a	Teaching content -> Satisfaction	0.230	3.638	0.000	Support
H1b	Teaching content -> Learning willingness	-0.015	2.167	0.007	Reject
H2a	Teaching facilities -> Satisfaction	0.01	2.167	0.006	Support
H2b	Teaching facilities -> Learning willingness	-0.024	2.294	0.009	Reject
H3a	Enterprise needs ->Satisfaction	0.193	2.392	0.017	Support
H3b	Enterprise needs -> Learning willingness	0.108	1.973	0.003	Support
H4a	University -enterprise cooperation ->Satisfaction	0.182	2.656	0.008	Support
H4b	University -enterprise cooperation -> Learning willingness	-0.082	2.906	0.005	Reject
H5a	Digital support ->Satisfaction	0.074	1.122	0.002	Support
H5b	Digital support -> Learning willingness	0.159	1.785	0.004	Support
H6a	Talent policy support ->Satisfaction	0.133	2.106	0.035	Support
H6b	Talent policy support -> Learning willingness	0.000	0.005	0.086	Reject
H7	Satisfaction -> Learning willingness	0.506	8.674	0.000	Support

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

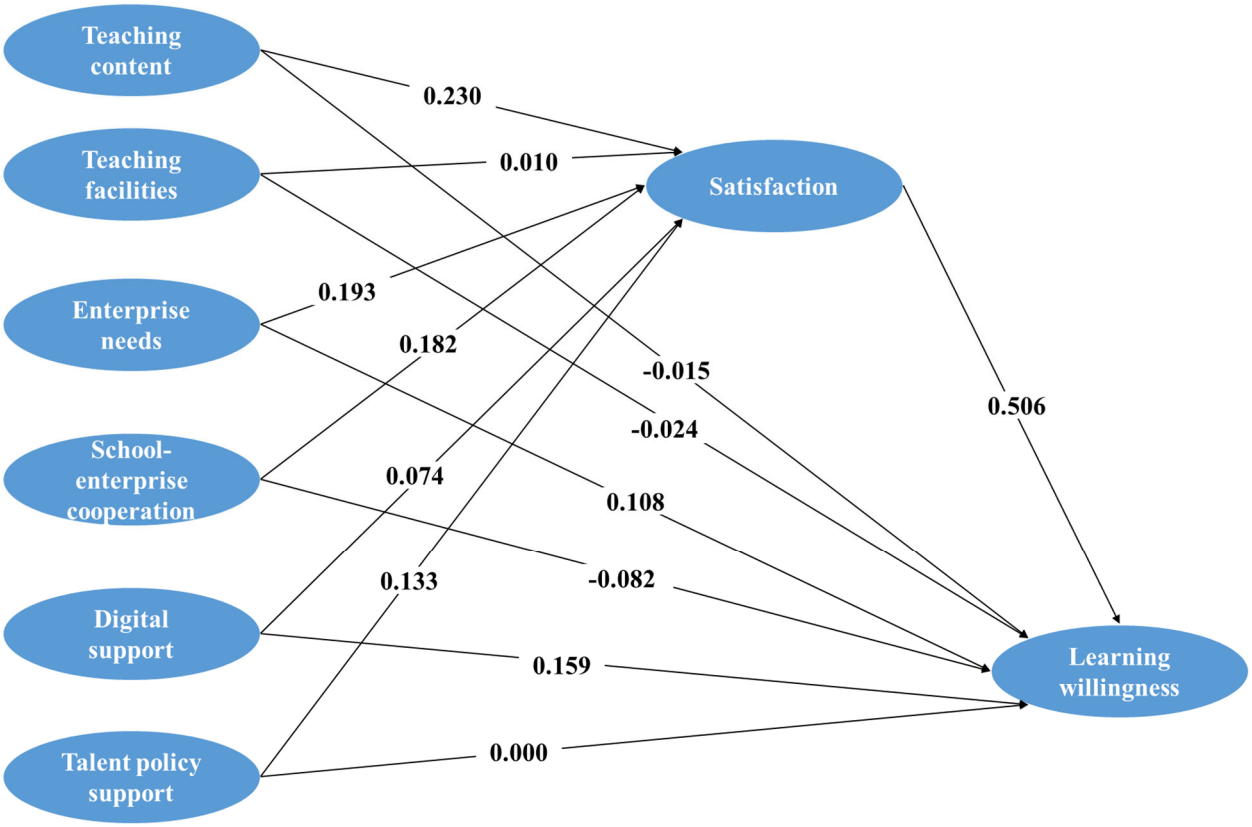

Figure 1. Model fitting path

5.2. Mediating effect test

The three-step model proposed by Wen Zhonglin et al was used to test whether students' satisfaction with the training of applied talents of supply chain operation management in the digital economy could play a mediating role between acquired characteristic variables and students' learning willingness[25]. The steps are as follows: First, regression model 1, that is, the regression model of independent variable X to dependent variable Y, is constructed. Secondly, regression model 2, i.e. the regression model of independent variable X to mediating variable M is established, then, regression model 3, i.e. the regression model of independent variable X and mediating variable M to dependent variable Y is developed. Finally, through the comprehensive judgment of the significance of each coefficient in the three regression models, a conclusion can be drawn about the relationship between independent variable X, mediating variable M and dependent variable Y, The results are shown in Table 6. According to the data in Table 6, student satisfaction plays a full mediating role in the influence of talent policy support on students' learning intention, so Hypothesis Hl3 is supported; Student satisfaction is fully mediated between the three front-end variables of teaching content, teaching facilities and university-enterprise cooperation and students' learning intention, so H8, H9 and H11 are also supported. After testing the remaining factors, it can be seen that the independent variable has a positive impact on the dependent variable after adding the mediating variable, but the degree of impact has decreased, indicating that student satisfaction is partially mediated by the impact of enterprise demand and digital support on students' learning willingness, so Hl0 and H12 are established.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

Table 6. Mediating effect test of student satisfaction

Independent variables X, Z	Model one	Model two	Model three
	The dependent variable (willingness to learn)	Mediating Variable (satisfaction)	The dependent variable (willingness to learn)
Teaching content	0.104**	0.23**	-0.015**
Teaching facilities	-	-	0.230**
Enterprise needs	-0.017**	0.011**	-0.024**
University -enterprise collaboration	-	-	0.011**
Digital support	0.202**	0.193**	0.108**
Talent	-	-	0.167**
Cultivate Support	0.008**	0.183**	-0.082**
Satisfaction	-	-	0.183**
Learning willingness	0.204**	0.074**	0.159**
Scale overall	-	-	0.053**
Teaching content	0.062	0.132**	0.000
Teaching facilities	-	-	0.133**

Notes: **and***indicate p<0.01andp<0.001, respectively.

5.3. Model modification

According to the above test results, all hypotheses except Hla, H2a, H4a and H6a are valid. Then SmartPLS 4.0 was used to verify the model again. The mode modification method referred to the research results of Yang et al., and the modified model is shown in Figure 2. The influence effect of each variable could be obtained from the modified standardized path coefficient. 0lBy analyzing the data, the following conclusions can be drawn:

First of all, without the intervention of mediating variables, the direct effects of the influencing factors in descending order are digital support (0.143) and enterprise demand (0.021); In the case of mediating variable intervention, the total effect of influencing factors in descending order was digital support (0 204), enterprise demand (0.202), teaching content (0.104), talent training support (0.062), teaching facilities (0.017), and university-enterprise cooperation (0.008). It can be seen that the intervention of mediating variables does not change the ranking results of the influence degree of characteristic factors on consumers' repurchase intention, and the influence of government and enterprise dimension factors on students" learning intention is more significant. Therefore, digital support and enterprise demand will be the key to improving students' willingness to learn knowledge and skills of supply chain operation management.

Secondly, student satisfaction significantly positively affects students' willingness to learn (0.494). According to the proportion of the mediating effect of satisfaction on each influencing factor, the descending order is teaching content (100%), talent training support (100%), teaching facilities (100%), university-enterprise cooperation (100%) enterprise demand (89.60%), digital support (29.90%).

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

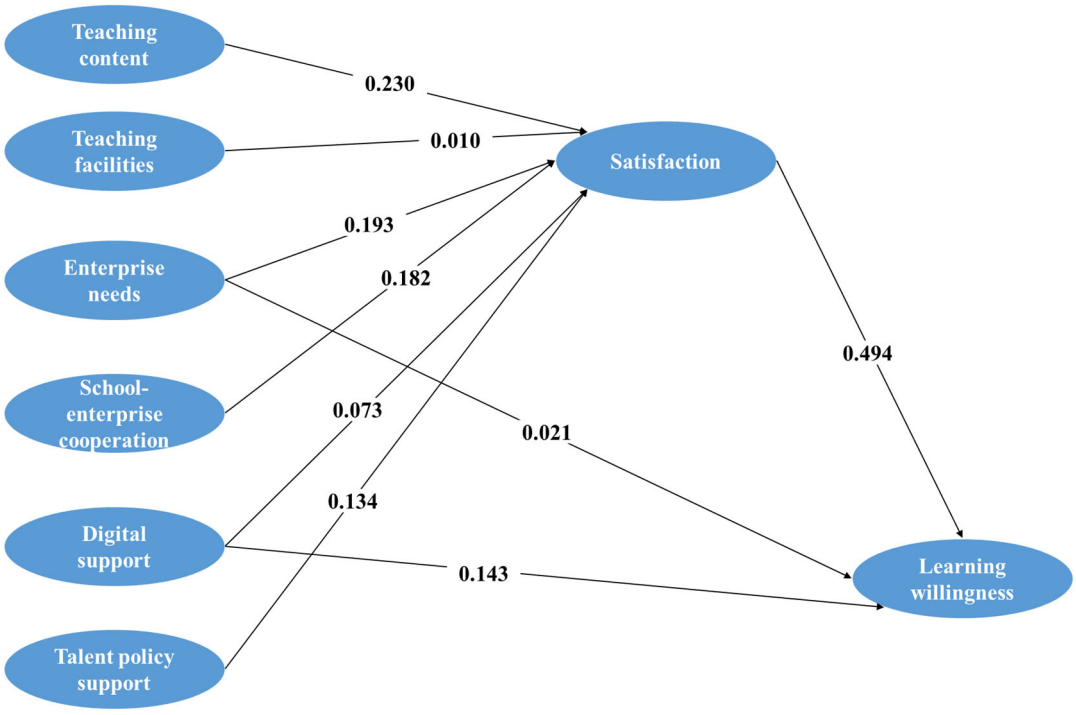

Figure 2. Corrected model

Table 7. Effect of each Variable on students willingness to learn

Variables	Direct effect	Indirect effect	Total effect	Proportion of mediating effect /%
Teaching content	N/A	0.104	0.104	100.00%
Teaching facilities	N/A	0.017	0.017	100.00%
Business needs	0.021	0.181	0.202	89.60%
University-enterprise cooperation	N/A	0.008	0.008	100.00%
Digital support	0.143	0.061	0.204	29.90%
Talent training and support	N/A	0.062	0.062	100.00%
Satisfaction	0.494	N/A	0.494	N/A

6. Conclusion and Enlightenment

6.1. Research conclusions

Based on the background of the digital economy, this study constructs a research model of the influence of multi-factor characteristics of supply chain operation management talent training on its training effect and students' learning willingness. The model extracts the characteristic factors of the training of applied talents of supply chain management from the three dimensions of university, enterprise, and government respectively, and reveals the mechanism of the characteristic factors influencing students' learning willingness under each dimension. Through the research, the following conclusions are drawn:

Firstly, teaching content and teaching facilities have a positive impact on the training satisfaction of applied talents in supply chain operation management, and play a complete intermediary role in the process of talent training satisfaction. Compared with other influencing factors, the influence degree of teaching content and facilities on talent training satisfaction and students' learning willingness is at an intermediate level, indicating that the teaching content

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

and facilities at the university level can significantly affect students' learning effect on the courses related to supply chain operation management. Those teaching contents that include digital intelligent technology, are close to reality, and cleverly integrated into ideological and political education are more likely to attract students. At the same time, well-equipped teaching facilities can create a comfortable learning environment, thus enhancing students" satisfaction and their willingness to learn.

Secondly, enterprise demand and digital supply chain policy supporthave8positive impact on the training satisfaction of applied talents of supply chain operation management and students' learning willingness. Among them, student satisfaction plays a significant partial mediating role between enterprise demand and students' learning willingness and plays a complete mediating role between university-enterprise cooperation and students' learning willingness. From the analysis on the total effect of characteristic factors on students' learning intention, enterprise demand, and digital supply chain policy support are the two factors with the greatest influence. This shows that under the background of the digital economy, the measures that can meet the needs of students, such as providing job mentors, real projects, and enterprise consulting services will become the key factors affecting the training effect of applied talents in supply chain operation management.

Thirdly, university-enterprise cooperation and supply chain operation management talent policy support have a positive impact on talent training satisfaction, and student satisfaction plays a full mediating role in this process. Among the six influencing factors university-enterprise cooperation has the lowest impact on learning intention, which indicates that students in Tianjin have a low understanding of the content of university-enterprise cooperation, university-enterprise cooperation mode has not yet become the main means to promote students" learning intention, and there is little difference in students' perception of different university-enterprise cooperation modes. Therefore, the government needs to lead the research to innovate the university-enterprise cooperation strategy and strengthen the publicity of the talent training policy.

6.2. Implications of research

Under the development trend of industrial intelligence, network connection, and digitalization, the digital economy not only enables the real economy but also becomes a new path to achieve high-quality economic development. The transformation and upgrading of the economy cannot be separated from the transformation and upgrading of vocational education, which is based on the "service industries are related, vocational posts are interconnected, Integration of professional culture and common professional quality; The development of the digital economy has become a national strategy and the trend of The Times. Through the above analysis, this paper obtains several implications for the training of supply chain applied talents:

Firstly, in the training of supply chain operation and management talents, the key applied colleges and universities is to strictly control the teaching content and teaching facilities from the perspective of the university, and prepare for the training of applied talents with digital intelligence, to meet the personalized needs and vocational pertinacity of students, improve their willingness to learn, and enhance their employment competitiveness. Colleges and universities should timely adjust the course content, teaching methods, and supporting experimental equipment, and set up high-quality experimental courses to ensure that students can obtain the necessary skills and experience in practical operation.

Secondly, enterprises should strengthen the induction and description of talent needs and provide corresponding resources. Enterprises need to further formulate clear management measures, standardize project process, and promote the virtuous cycle of industry-university-research cooperation. In order to improve the level of university-enterprise cooperation, enterprises should actively carry out the research and development of supply chain products,

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

and do a good job in docking with the practical instructors, so as to provide students with higher quality practice guidance. Through in-depth cooperation with universities, enterprises can actively seek high-quality project opportunities, so that students can master the core technology in production practice, so as to improve their own competitiveness.

Thirdly, the government's policy support for digital supply chain and supply chain operation management talents needs to formulate appropriate incentive policies for regional supply chain digital transformation, and further improve the training, introduction, and guarantee of talent to meet the needs of enterprise development and talent employment. By formulating relevant policies, and providing financial support and technical training, the government can promote the implementation of digital supply chain management in enterprises, and encourage universities to adjust the curriculum and strengthen the teaching content in the field of digital supply chain management, so as to meet the market demand for supply chain applied talents under the background of digital economy.

Acknowledgements

This paper is a phased achievement of the 2022 Tianjin Education Science Planning Project "Innovation Research on Supply Chain Management Applied Talent Training for Digital Economy" (general project) (project number: CAE220038).

About the author:

First author: Yi Tian (1983-), female, Han nationality, doctor, lecturer, School of Economics and Management, Tianjin University of Technology and Education. Her research interests include higher education, vocational education, supply chain operation and management, and e-commerce.

Tel: 15022582851, Email: tianyicnro@126.com

Address: Tianjin University of Technology and Education (No.1310 Dagu South Road, Hexi District, Tianjin)

Second author: Xinyi Zhang (2001-), female, Han nationality, graduate student of Tianjin University of Technology and Education.

Corresponding author: Yuxin Ye (2002-), female, Han nationality, student of Tianjin University of Technology and Education.

References

[1] Zhang Yu, Jiang Dianchun. International Trade in the Digital Economy: Theoretical Reflections and Prospects [J]. Tianjin Social Sciences, 2021(3): 9.

[2] Li Xinming, Liao Jinlong. Enlightenment of the Emerging Technology Industry on University Education Development -Review of "The Chinese Path of the Integration of Information Technology and Education Development" [J]. Chinese Educational Gazette, 2022(1): 1.

[3] Jia Y, Xiao K, Ren L, et al. Research on Practice Teaching Mode for Undergraduates in the Age of Emerging Engineering Education [J]. The International Journal of Electrical Engineering & Education, 2019: 0020720919867412.

[4] Yu Huigang. The Evolution of Interest Game and Distribution Pattern under the Government's Intervention in School-Enterprise Cooperation [J]. Higher Engineering Education Research, 2020(5): 6.

[5] China Academy of Information and Communications Technology. Research Report on the Development of China's Digital Economy [EB/OL]. http://www.caict.ac.cn, January 2023.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

[6] Chen Jian, Liu Yunhui. Digital Intelligence Enables the Transformation of Operational Management: From Supply Chain to Supply Chain Ecosystem [J]. Management World, 2021, 37(11): 227-240+14.

[7] Song Qiming. The Current Status and Influencing Factors of College Students' Employment Ability Cultivation - An Empirical Study Based on the Survey Data of Undergraduate Graduates [J]. Research in Educational Development, 2017, 37(23): 23-29.

[8] Xu Zeshui, Qian Yu, Gou Xunjie. A Comprehensive Discussion on the Current Status of Supply Chain Development from the Perspective of Game Theory: Based on Visualized Tools [J]. Journal of Systems Management, 2022, 31(06): 1056-1074.

[9] Song Hua. Theoretical Exploration and Prospects of Artificial Intelligence Digital Supply Chain [J]. China Economic Journal, 2024, 38(01): 44-54.

[10] Cai Yuzhuo, Zhang Qiaotong. From University to Workplace: A Review, Reflection, and New Directions for Graduate Employment Research [J]. Peking University Education Review, 2023, 21(03): 23-50+187-188.

[11] Guo Xin. A Study on the Cultivation of Employment Ability of Contemporary Chinese College Students [D]. Jilin University, 2017.

[12] Yang Mei, Wang Ying, Zhou Zhengzhu. The Dilemma and Breakthrough Path of Deep Integration of Industry and Education in Applied Undergraduate Colleges [J]. Vocational and Technical Education, 2021, 42(30): 26-32.

[13] Liu Yourong, Xiang Gui'e, Wang Jiancheng. A Study on the Industry-Education Integration Model and Its Influencing Factors in Applied Undergraduate Colleges [J]. China Higher Education Research, 2015(05): 64-68.

[14] Wang Linhai, Liu Hongyan. An Empirical Study on the Effectiveness of Online Learning of Foreign Language Majors during the Epidemic [J]. Foreign Language Electronic Teaching, 2023(01): 40-43+75+110.

[15] Berg.A, Buffie.E., Zanna.L, "Should we fear the robot revolution? (The correct answer is yes)", Journal of Monetary Economics, 2018, 8(97): 117-148.

[16] Acemoglu.D, Restrepo.P, "The race between man and machine: Implications of technology for growth, factor shares, and employment", The American Economic Review, 2018, 6(108): 1488-1542.

[17] Venkatesh V M D D. User Acceptance of Information Technology: Toward a Unified View [J]. MIS Quarterly, 2003(27): 425-478.

[18] Oye N D, A Iahad N, Ab Rahim N. The history of UTAUT model and its impact on ICT acceptance and usage by academicians [J]. Educ Inf Technol, 2014(19): 251–270.

[19] JACOBS R L. Work analysis in the knowledge economy [M]. New York: Palgrave Macmillan. 2019: 59.19-59.238.

[20] Chen Xiaohong. Analysis of the Trend of Technology Integration and Application Innovation in the Digital Economy Era [J]. Journal of Central South University (Social Science Edition), 2018, 24(05): 1-8.

[21] Ye Suwen. Ideas and Suggestions on the Design of Research-Oriented Teaching for Supply Chain Management Courses [J]. Journal of Zhejiang Wanli University, 2014, 27(02): 99-103.

[22] Shao Lingzhi. Exploration and Practice of Ideological and Political Education in the Course of "Logistics and Supply Chain Management" [J]. China Logistics and Purchasing, 2022(04): 58-59.

[23] Bhattacherjee, Anol. "Understanding Information Systems Continuance: An Expectation-Confirmation Model." [J]. MIS Quarterly, 2001(25): 351-370.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202412_7(12).0017

[24] Wen Zhonglin, Fang Jie, Xie Jinyuan, et al. A Methodological Study on Mediation Effect in China [J]. Progress in Psychological Science, 2022, 30(08): 1692-1702.

[25] Yang Jie, Wang Lu. Influencing Factors of Consumer Repurchase Intention under the "Live Broadcast + E-commerce" Model [J]. China Economic Journal, 2021, 35(11): 56-66.