Online-Journals.org

iJET International Journal of Emerging Technologies in Learning

iJET | eISSN: 1863-0383 | Vol. 18 No. 15 (2023) | OPEN ACCESS

https://doi.org/10.3991/ijet.v18i15.42385

PAPER

Training Quality Evaluation of Innovative and Entrepreneurial Talents for Smart Tourism

Xiangpeng Chang(✉), **Shanshan Wang**, **Dong Ding**

Shijiazhuang University of Applied Technology, Shijiazhuang, China

2001000251@sjzpt.edu.cn

ABSTRACT

The smart tourism industry is developing at an incredible pace and has posed requirements for persons with related skills and talents, especially those with creative thinking, innovation ability, and entrepreneur quality. The training quality evaluation of innovative and entrepreneurial talents could provide guidance for the decision-making of higher educational institutions and enterprises so that proper adjustments can be made to current education system and curriculum setting. However, little existing research has addressed this issue, so this study attempts to develop a method for evaluating the training quality of innovative and entrepreneurial talent responding to the requirements of smart tourism. The quality control of innovative and entrepreneurial talents for the smart tourism industry is discussed to ensure that the evaluation criteria can be implemented during the training process, then an evaluation index system (EIS) is created with weight values assigned to each index by the entropy method, and the gray comprehensive evaluation method is employed for the said evaluation task. Finally, linear regression and other experiments are carried out to prove the scientific validity of the proposed method. Research conclusions attained in this study provide useful evidence for optimizing the training strategies of innovative and entrepreneurial talents.

KEYWORDS

smart tourism, innovative and entrepreneurial talents, training quality, entropy method, gray comprehensive evaluation

1 INTRODUCTION

Thanks to modern technologies, smart tourism has become an indispensable part of the modern tourism industry and a new trend for global traveling. Big data, cloud computing, the internet of things (IoT), and other new technologies are the technical foundation of smart tourism, and their common purpose is to improve the operational efficiency of the tourism industry, optimize the allocation of tourism resources, and improve the traveling experience of tourists [1–5]. Kontogianni and Alepis [6] expanded the borders of the smart tourism using the concepts of AI, blockchain, and cybertourism.

Chang, X., Wang, S., Ding, D. (2023). Training Quality Evaluation of Innovative and Entrepreneurial Talents for Smart Tourism. *International Journal of Emerging Technologies in Learning (iJET)*, 18(15), pp. 174–188. https://doi.org/10.3991/ijet.v18i15.42385

Article submitted 2023-05-11. Resubmitted 2023-06-16. Final acceptance 2023-06-17. Final version published as submitted by the authors.

As the smart tourism industry is developing at an incredible pace, it has posed a demand for persons with related skills and talents, especially those with creative thinking, innovation ability, and entrepreneurial skill [7, 8]. In this context, it is important to be able to evaluate the training quality evaluation those with innovative and entrepreneurial talents in smart tourism [9–11]. Luo et al. [12] mentioned that the quantity and quality of human resources of tourism industry in China have increased rapidly in the Internet+ era, making positive contributions to the development of tourism industry, but there is still a big gap between the current quality and structure of human resources and the requirements of the tourism industry, which has restricted further development of Chinese tourism industry to some extent.

Smart tourism needs talented individuals with innovation ability and entrepreneur quality to drive the development of the industry [13–17]. The training quality evaluation of innovative and entrepreneurial talents can provide guidance for the decision-making in higher educational institutions and enterprises, so that more qualified candidates can be cultivated to fit the requirements of the industry. Proper evaluation helps to optimize the current educational system to improve training quality and cultivate more competent personnel to promote the development of smart tourism.

In practice, there are flaws with current training quality evaluation methods for smart tourism talent (STT), as the available methods may concentrate on some specific indexes (academic achievement or rewards), while ignoring other aspects that matter (e.g., innovation ability, entrepreneur quality, teamwork, and interdisciplinary knowledge). As a result, evaluation results may fail to reflect the true quality of talent training. Another flaw lies in the excessive reliance on quantitative indexes, which tend to simplify talent training quality into quantifiable data but might not be able to assess hard-to-quantify but equally important factors, such as creative thinking and practical capability. In view of these shortcomings, this study attempts to explore a new STT evaluation method.

2 ABOUT STT TRAINING QUALITY CONTROL

Figure 1 summarizes the connotation of smart tourism. The development of smart tourism requires excellent talents because the primary impetus of this industry is new technologies. Talents with good innovation and entrepreneurial ability can bring novel technical solutions for smart tourism and promote technological upgrading. As smart tourism emphasizes the tourist experience, it also needs such talents to constantly optimize the content and form of the services it offers to satisfy the diverse needs of tourists and raise their satisfaction. Another reason is that high-quality talents can deliver business value, develop new business models, and realize sustainable development of the entire industry. Figure 2 diagrams an STT training mode.

Fig. 1. Connotation of smart tourism

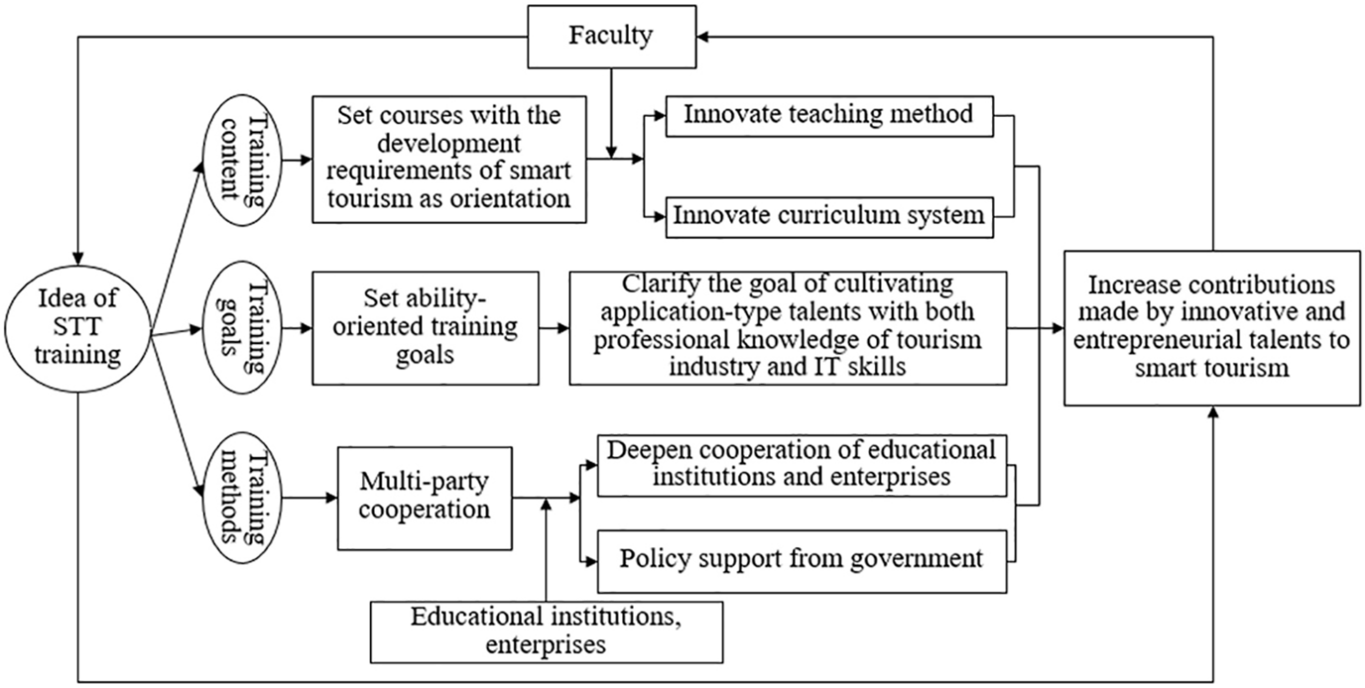

Fig. 2. STT training mode

Before STT evaluation, the topic of STT training quality control should be discussed first to ensure each evaluation criterion can be implemented during the talent-training process, as this is conducive to reaching the expected quality goal and meeting the development requirements of smart tourism; moreover, the discussion is useful for discovering defects and problems in the training process, so that optimizations and adjustments can be made from aspects of training strategy, curriculum setting, and teaching method, and ultimately improve the training effect.

In terms of curriculum setting, Figure 3 lists six courses that are beneficial to quality improvement of STT training, including basic knowledge of the tourism industry (Course 1), information technology and data analysis (Course 2), intelligent tourism technology (Course 3), basics of innovation and entrepreneurship (Course 4), teamwork and communication (Course 5), and international vision training (Course 6). Specifically, basic knowledge of the tourism industry contains tourism resource science, tourism geography, tourism management, and tourism marketing. Information technology and data analysis contains computer foundation and programming, data structure and algorithm, database management, data mining and analysis, and artificial intelligence and machine learning. Intelligent tourism technology contains tourism information system, tourism e-commerce, tourism big data applications, application of virtual reality and augmented reality in tourism, smart tour guides, and intelligent recommendation system. Basics of innovation and entrepreneurship contains innovative thinking and methodology, entrepreneurship theory and practice, business-model design, project management, innovation, and entrepreneurship case analysis. Teamwork and communication contains team building and collaboration, communication skills and public relations, business negotiation and contract management, and cross-cultural communication and management. International vision training contains an overview of international tourism development, international tourism market analysis, international tourism policies and regulations, and multilingual training (such as English, French, Japanese). As can be known from Figure 3, most people believe that the above six courses have a positive effect on quality improvement of STT.

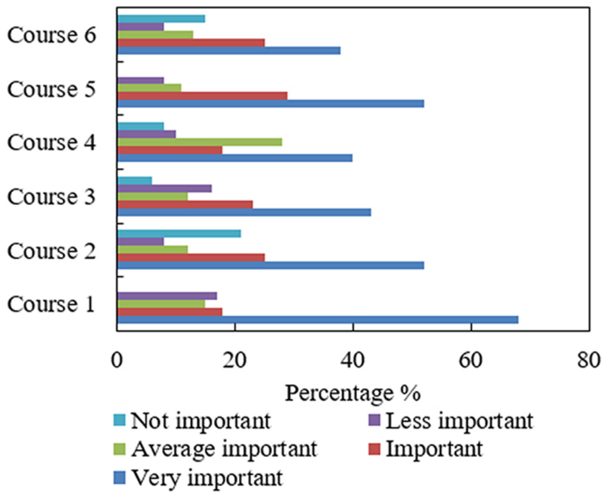

Fig. 3. Courses for quality improvement of STT training

For training history and behavior data of STT, this study proposed a crowd sensing–based multi-strategy model according to the degree of effort, which can make better use of the training history and behavior data to analyze the talent-training effect from multiple angles and improve the accuracy and correctness of evaluations. This model can give differentiated evaluations based on the degree of effort made by each individual, so as to better discover and explore the potential of each person and provide more targeted training schemes and guidance, thereby optimizing the training strategy of STT, spotting defects and improvement space of current strategy, and enhancing training quality. Through the analysis of training history and behavior data, the multi-strategy model can predict the development potential of STT, and give useful references for talent selection, cultivation, and usage.

Assuming that h represents the degree of efforts of STT, D represents the contribution made by STT to the development of smart tourism, and γ_j represents a random variable, then the relationship between h and D can be expressed as:

$$T_n(H_n) = h_n \gamma_n \tag{1}$$

where, γ_j conforms to the normal distribution of probability density function $r(\gamma)$. When an STT considers whether his/her skills meet the requirements of smart tourism, he/she might give up his/her strengths, thereby causing a consumption cost of the skills. The consumption cost refers to the investment or cost required to acquire, develop, or improve a certain skill. This includes time costs, economic costs, opportunity costs, energy costs, and social costs. Assuming: d_{nm} represents the contribution made by STT n to the demand side m of smart tourism development, $G(t_{nm})$ represents the disutility for completing the task, namely the consumption cost, and it satisfies $G'(d_{nm}) > 0$ and $G''(d_{nm}) > 0$, then the consumption cost can be calculated as follows:

$$G(d_{nm}) = (\alpha d_{nm}^{\ 2}) / 2, d_{nm} \in D_n \tag{2}$$

The utility of STT is the difference between the innovative and entrepreneurial performance of the STT and the disutility. Assuming $O^m{}_n(d_{nm})$ represents the utility generated by the contribution made by STT n to the demand side m of smart tourism development and $T(d_{nm})$ represents the contribution fee paid by the demand side m

of smart tourism development to STT n, then the value of utility can be calculated by the following formula:

$$O_m^n(d_{nm}) = T(d_{nm}) - G(d_{nm}) \tag{3}$$

The contribution of STT can bring benefits to the demand side of smart tourism development, and the latter needs to pay certain rewards to the STT. The utility of the demand side is the difference between profit and reward. Assuming $O^m{}_n(d_{nm})$ represents the utility generated by the contribution made by STT n to demand side m and $V(d_{nm})$ represents the benefits brought by the contribution, then the value of utility can be calculated by the following formula:

$$O_m^n(d_{nm}) = V(d_{nm}) - T(d_{nm}) \tag{4}$$

$V(d_{nm})$ satisfies the following formula:

$$V(d_{nm}) = \kappa d_{nm}, d_{nm} \in D_n \tag{5}$$

Although a demand side cannot directly observe the actual training process of STT, it can still know the degree of contribution made by STT. To ensure both the training quality of STT and the contribution made by STT to smart tourism development, the demand side can formulate a measurement method of STT training quality. In this study, the contribution of STT was divided according to the degree of efforts. Assuming d_{BZGX} represents standard contribution and s represents adjustable parameter, then:

$$CL = \tanh(s\ln(d_{nm} / d_{BZGX})) \tag{6}$$

When the degree of efforts is less than 0, it indicates that a STT does not make enough effort in the training process, so its contribution cannot meet the development requirements of smart tourism. In this study, the degree of effort of STT was determined based on his/her actual contribution to the development of smart tourism. STTs of different degrees have different utility functions, and the utility value of different-degree STTs can be calculated by the following formula:

$$\begin{cases} O_{LE_q}^m(d_{nm}) = (x+1.5)T(d_{nm}) - G(d_{nm}), BZGX_5 < 0 \\ O_{LE_q}^m(d_{nm}) = T(y, d_{nm}) - G(d_{nm}), BZGX_5 \geq 0 \end{cases}, t = \{1,2,3,4,5\} \tag{7}$$

The evolutionary game model and the Wright-Fisher model in biology were combined to analyze the evolution of the training strategy of STT and the demand side of smart tourism development. This method provides a brand new theoretical framework for the quality evaluation of STT training by introducing principles of biology into the field of economics, thereby offering more possibilities and innovative points. Through the establishment of the repeated game model, the interaction between STT and the demand side could be understood better, thereby providing more useful evidence for the formulation of talent-training strategies. Adjusting the discount factor under the Nash equilibrium state is conducive to solving the crowd-sourcing dilemma, achieving a win-win between STT and the demand side, and promoting the healthy development of the smart tourism industry. The reward calculation formula was designed according to the discount factor, which facilitates encouraging STTs to better devote themselves to the development of smart tourism and improving the training quality of STTs.

To analyze the strategy evolution of STT training quality and smart tourism development, a multi-strategy repeated-game model was constructed to motivate STTs. Under the condition of a certain discount factor, the triggering strategy of infinite repetitions of the game process between STT and demand side can form a sub-game Nash equilibrium, so that the long-term requirements of smart tourism development could be met in the long run.

Assuming τ_h represents the total reward when STT does not violate the triggering strategy and τ_k represents the total reward for STT violating the triggering strategy in period p, then:

$$\tau_h=(T(d_{nm})-G(d_{nm}))+\lambda^*(T(d_{nm})-G(d_{nm}))+\lambda^{2*}(T(d_{nm})-G(d_{nm}))+\cdots+\lambda^{n-1*}(T(d_{nm})-G(d_{nm}) +\cdots,=1/1-\lambda^*(T(d_{nm})-G(d_{nm}))$$

$$\tau_k=(T(d_{nm})-G(d_{nm}))+\lambda^*(T(d_{nm})-G(d_{nm}))+\cdots+\lambda^{p-2*}(T(d_{nm})-G(d_{nm}))+\cdots+\lambda^{n-1*}(T(d_{nm}) +\lambda^{q*}(\vartheta T(d_{nm})+(1-\vartheta)Q_0)+\lambda^{p+1*}(\vartheta T(d_{nm})+(1-\vartheta)T_0)+\cdots$$

$\tau_h-\tau_k>0$ can be taken as the sufficient condition to ensure that STT is not violating the triggering strategy, then this constraint condition can be expressed as:

$$T > T_0 + G(d_{nm}) + \frac{1-\lambda}{\lambda(1-\vartheta)} \times G(d_{nm}) \tag{8}$$

From the perspective of the demand side, if the demand side chooses not to use or cooperate with a STT, then its utility is 0. Therefore, in the process of infinite repetitions of the game, the sufficient condition for the demand side to follow the triggering strategy is $1/1-\vartheta(V(d_{nm})-Td_{nm})-\mathrm{T(dnm)})>0$, namely:

$$V(t_{nm}) - T(t_{nm}) > 0 \tag{9}$$

By combining the above two formulas, the final result can be attained as:

$$V(t_{nm}) > T > T_0 + G(t_{nm}) + \frac{1-\lambda}{\lambda(1-\vartheta)} \times G(t_{nm}) \tag{10}$$

The discount factor can be calculated as follows:

$$\lambda > \lambda^* = \frac{G(t_{nm})}{G(t_{nm}) + (1-\vartheta)(V(t_{nm}) - T_0 - G(t_{nm}))} \tag{11}$$

The formula for calculating the rewards of STT is:

$$T = T_0 + G(t_{nm}) + \frac{1-\lambda}{\lambda(1-\vartheta)} \times G(t_{nm}) \times (1+y) \tag{12}$$

3 STT TRAINING QUALITY EVALUATION BASED ON THE GRAY COMPREHENSIVE EVALUATION METHOD

In this Section, an EIS was built for evaluating STT training quality. The first-level indexes include knowledge structure rationality, innovation ability, actual application skill, teamwork and communication, and degree of industry-education integration. Specifically, knowledge structure rationality contains aspects of mastery of professional knowledge, breadth of interdisciplinary knowledge, mastery of IT, and tourism knowledge. Innovation ability contains aspects of the ability to discover and solve problems, the ability to apply new skills and methods, and innovation projects and outcomes. The actual application skill contains aspects of practical operation skills, work scene adaptability, and rich practical experience. The teamwork and communication index contains aspects of team spirit, ability of communication and expression, and ability of cross-cultural communication. The degree of industry-education integration contains enterprise internship experience, participation of school-enterprise cooperative projects, and enterprise guidance level.

Next, the entropy method was adopted to assign weights to evaluation indexes. At first, the data of evaluation indexes was standardized to eliminate the difference of data dimension between indexes. Assuming O_{nm} represents the value of the m-th evaluation index in the n-th factor layer, max{O_m} and min{O_m} represent the maximum and minimum values of the m-th evaluation index, and i represents the number of indexes, then the formulas for standardizing positive and negative indexes are:

$$O'_{nm} = \frac{O_{nm} - \min\{O_m\}}{\max\{O_m\} - \min\{O_m\}} \tag{13}$$

$$O'_{nm} = \frac{\max\{O_m\} - O_{nm}}{\max\{O_m\} - \min\{O_m\}} \tag{14}$$

The dimensionless processing was performed based on the following formula:

$$B_{nm} = \frac{O'_{nm}}{\sum_{n=1}^{i} O'_{nm}} \tag{15}$$

For each evaluation index, its information entropy was calculated:

$$h_{nm} = -\frac{1}{\ln i} \sum_{n=1}^{i} b_{nm} + vjb_{nm} \tag{16}$$

Further, the information redundancy was calculated:

$$q_{nm} = 1 - h_m \tag{17}$$

And last, the index weight was calculated:

$$z_{nm} = \frac{q_m}{\sum_{n=1}^{i} q_m} \tag{18}$$

The gray comprehensive evaluation method was adopted to evaluate the training quality of STTs. At first, the data of each evaluation index of the object being evaluated was collected to construct the evaluation matrix. Assuming O_{nms} represents the score of evaluation index O_{nm} given by evaluator S, then the expression of the evaluation matrix is:

$$Q = \begin{bmatrix} o_{111} & o_{112} & . & . & o_{11s} \\ o_{121} & o_{122} & . & . & o_{12s} \\ . & . & . & . & . \\ . & . & . & . & . \\ o_{nm1} & o_{nm2} & . & . & o_{nm3} \end{bmatrix} \tag{19}$$

Each evaluation index was divided into several gray categories, and each gray category corresponded to a level. Assuming A_{nmh} represents the gray evaluation coefficient of evaluatee of index O_{nm} belonging to the h-th gray category and A_{nm} represents the total gray evaluation coefficient of the evaluatee belonging to each gray category, then the formulas for calculating the gray evaluation coefficients are:

$$A_{nmh} = \sum_{s=1}^{n} r_h(o_{nms}) \tag{20}$$

$$A_{nm} = \sum_{h=1}^{4} A_{nmh} \tag{21}$$

The gray evaluation weight matrix was calculated based on the evaluation matrix and the gray category matrix. Each row of the matrix represents the gray weight of the evaluation object in terms of each evaluation index. Assuming F_{nmh} represents the gray evaluation weight of evaluatees belonging to the h-th gray category, $f_{nmh} = A_{nmh}/A_n$, then the gray evaluation weight matrix of o_{nm} belonging to each gray category can be expressed as:

$$F_n = \begin{bmatrix} f_{n1} \\ f_{n2} \\ . \\ . \\ . \\ f_{nj} \end{bmatrix} = \begin{bmatrix} f_{n11} & f_{n12} & f_{n13} & f_{n14} & f_{n15} \\ f_{n21} & f_{n22} & f_{n23} & f_{n24} & f_{n25} \\ . & . & . & . & . \\ . & . & . & . & . \\ . & . & . & . & . \\ f_{nj1} & f_{nj2} & f_{nj3} & f_{nj4} & f_{nj5} \end{bmatrix} \tag{22}$$

Assuming Y represents the evaluation result of gray evaluation weight matrix, Z_n represents the weight vector of second-level indexes, and it satisfies $Y_n = Z_n * F_n = (y_{n1}, y_{n2}, y_{n3}, y_{n4}, y_{n5})$, then:

$$Y_n = \begin{bmatrix} Y_1 \\ Y_2 \\ . \\ . \\ Y_5 \end{bmatrix} = \begin{bmatrix} y_{11} & y_{12} & y_{13} & y_{14} & y_{15} \\ y_{21} & y_{22} & y_{23} & y_{24} & y_{25} \\ . & . & . & . & . \\ . & . & . & . & . \\ y_{51} & y_{52} & y_{53} & y_{54} & y_{55} \end{bmatrix} \tag{23}$$

According to the gray evaluation weight matrix and the weight vectors of each evaluation index, the gray comprehensive evaluation value of each evaluation object was calculated. Assuming Z represents the weight vector of first-level indexes, then:

$$Y = Z * Y_n = Z * \begin{bmatrix} y_{11} & y_{12} & y_{13} & y_{14} & y_{15} \\ y_{21} & y_{22} & y_{23} & y_{24} & y_{25} \\ . & . & . & . & . \\ . & . & . & . & . \\ y_{51} & y_{52} & y_{53} & y_{54} & y_{55} \end{bmatrix} = (X_1 X_2 X_3 X_4 X_5) \tag{24}$$

Each evaluation object was mapped into the corresponding quality level according to its gray comprehensive evaluation value. Assuming L represents the vector of effort degrees, that is $L = (5, 4, 3, 2, 1)$, then the gray comprehensive evaluation value $W = Y^*L^P$ could be attained further, by substituting W into $Rh(O_{nms})$, and the gray category could be solved.

4 EXPERIMENTAL RESULTS AND ANALYSIS

According to Figure 4, in terms of A1 (knowledge structure rationality), 82 respondents think this ability is very important, and 15 think it is important. Obviously, most respondents think a rational knowledge structure is very important for STTs, and this indicates that it is a key to have interdisciplinary knowledge and the ability to apply the knowledge comprehensively in the smart tourism field. In terms of A2 (innovation ability), 95 respondents think this ability is very important, 6 think it is important. Almost all respondents think this ability is crucial for STTs, and the development of smart tourism requires STTs to have creative thinking and the ability to solve problems. In terms of A3 (actual application skill), 63 respondents think this ability is very important, 23 think it is important, and 10 think it is less important. Most respondents think the actual application skill is very important for STTs, indicating that actual operations and practical experience play an important role in the development of STTs in the smart tourism field. In terms of A4 (teamwork and communication), 50 respondents think this ability is very important, 40 think it is important, and 20 think it is of average importance. Most respondents believe teamwork and communication skills are important for STTs, indicating that a good ability in teamwork and communication is crucial for the success of STTs during the development of smart tourism. In terms of A5 (degree of industry-education integration), 70 respondents think this ability is very important, 12 think it is important, 18 think it is of average importance, and 6 think it is less important: Most respondents believe the degree of industry-education integration is important for STTs, indicating that in the field of smart tourism, education and training that are closely combined with actual industrial requirements have a positive effect on the growth of STTs.

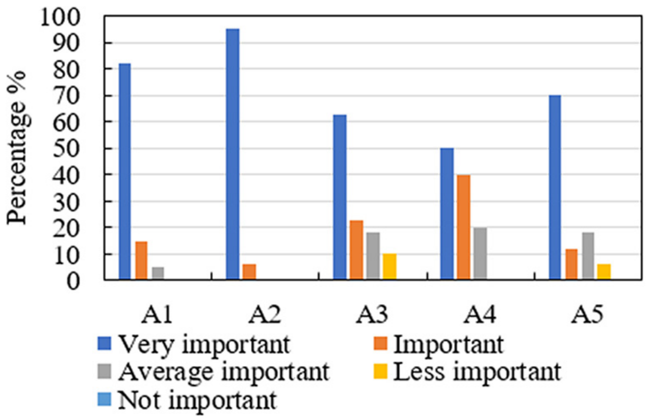

Fig. 4. Capabilities should be possessed by STTs

Based on the correlation coefficients given in Table 1, the following conclusions can be drawn.

Knowledge structure rationality (A1) is positively correlated with the other four evaluation indexes, its correlation with innovation ability (A2) is the highest (relevance value is 0.514, level of significance is 0.002), and its correlation with teamwork and communication (A4) is relatively low (relevance value is 0.241, level of significance is 0.003), indicating that knowledge structure rationality has a great influence on the innovation ability of STTs and it would affect the development of other capabilities of STTs.

Innovation ability (A2) is positively correlated with other evaluation indexes, its correlation with actual application skill (A3) is the highest (relevance value is 0.547, level of significance is 0.006), followed by its correlation with the degree of industry-education integration (A5) (relevance value is 0.469, level of significance is 0.036), and this indicates that innovation ability has a great influence on the actual application skill and the degree of industry-education integration.

Actual application skill (A3) is positively correlated with other evaluation indexes, its correlation with the degree of industry-education integration (A5) is the highest (relevance value is 0.715, level of significance is 0.016), followed by its correlation with teamwork and communication (A4) (relevance value is 0.462, level of significance is 0.004). This indicates that actual application skill is significantly correlated with the degree of industry-education integration, and highly correlated with teamwork and communication.

Teamwork and communication ability (A4) is positively correlated with other evaluation indexes, its correlation with actual application skill is the highest (relevance value is 0.462, level of significance is 0.004), followed by its correlation with the degree of industry-education integration (A5) (relevance value is 0.451, level of significance is 0.061). This indicates that teamwork and communication ability has a great influence on actual application skill and the degree of industry-education integration.

Degree of industry-education integration (A5) is positively correlated with other evaluation indexes, its correlation with actual application skill (A3) is the highest (relevance value is 0.715, level of significance is 0.016), followed by its correlation with innovation ability (A2) (relevance value is 0.469, level of significance is 0.036), indicating that the degree of industry-education integration has a great influence on both the actual application skill and the development of innovation ability.

Table 1. Correlation coefficients of evaluation indexes

		A1	A2	A3	A4	A5
A1	Relevance	1				
	Sig					
A2	Relevance	0.514**	1			
	Sig	0.002				
A3	Relevance	0.392*	0.547*	1		
	Sig	0.001	0.006			
A4	Relevance	0.241***	0.318**	0.462*	1	
	Sig	0.003	0.016	0.004		
A5	Relevance	0.285**	0.469*	0.715**	0.451**	1
	Sig	0.064	0.036	0.016	0.061	

Note: ***, **, * respectively, indicate that they passed the significance test at the levels of 1%, 5%, 10%.

Table 2 shows the results of one-way ANOVA of STT training quality control. According to the table, in terms of knowledge structure rationality (A1), the significance level of its F-values in aspects of utility, reward, contribution, and benefit is relatively low, indicating that knowledge structure rationality has only a small influence on STT training quality control.

In terms of innovation ability (A2). The significance level of its F-values in aspects of contribution and benefit is relatively high (the values are 0.041 and 0.036, respectively), indicating that the innovation ability has a large influence on STT training quality control, so attention needs to be paid to improving students' innovation ability during the talent-training process.

In terms of actual application skill (A3), the significance level of its F-values in aspects of contribution and benefit is relatively high (the values are 0.063 and 0.074 respectively), although slightly lower than the significance level of 0.05. It is still worthy of attention, and this indicates that the actual application skill has a certain influence on STT training quality control, so attention needs to be paid to enhancing students' actual application skill during the talent-training process.

In terms of teamwork and communication (A4), the significance level of its F-value in the aspect of benefit is relatively high (the value is 0.058). Although this is slightly higher than the significance level of 0.05, it still has a certain influence, indicating that the ability of teamwork and communication plays a certain role in STT training quality control, and attention needs to be paid to enhancing students' ability of teamwork and communication during the talent-training process.

In terms of the degree of industry-education integration (A5), the significance level of its F-value in the aspect of benefit is the highest (0.014), indicating that the degree of industry-education integration has a significant influence on STT training quality control; therefore, attention needs to be paid to promoting industry-education integration during the talent-training process, thereby enhancing students' hands-on ability and the ability to succeed in the industry.

Table 2. One-way ANOVA of STT training quality control

First-Level Index	Utility		Reward		Contribution		Benefit	
	F-Value	Significance	F-Value	Significance	F-Value	Significance	F-Value	Significance
A1	0.036	0.836	0.519	0.647	1.547	0.125	3.695	0.024
A2	0.374	0.541	1.241	0.247	6.392	0.041	12.514	0.036
A3	0.169	0.769	1.306	0.361	4.518	0.063	8.547	0.074
A4	0.425	0.405	1.285	0.152	3.415	0.095	5.392	0.058
A5	0.572	0.426	0.615	0.538	4.853	0.047	7.418	0.014

The constructed regression model was iterated five times, with A1, A2, A3, A4, and A5 entering the model successively, and the following conclusions were drawn based on the linear regression results shown in Table 3.

In the first round of iteration, knowledge structure rationality (A1) was introduced into the model, the R-value of the model is 0.514, the R^2 is 0.615, and the adjusted R^2 is 0.349, indicating that the interpretability of knowledge structure rationality for STT training quality is 34.9%.

Table 3. Summary of linear regression model

Model	R	R^2	Adjusted R^2	Estimated Standard Error
1	0.514	0.615	0.349	0.61527
2	0.695	0.371	0.317	0.52961
3	0.688	0.425	0.462	0.54875
4	0.684	0.469	0.405	0.43629
5	0.552	0.327	0.410	0.32774

In the second round of iteration, innovation capability (A2) was introduced into the model, the R value of the model was increased to 0.695, the R^2 is 0.371, and the adjusted R^2 is 0.317, indicating that after innovation capability was added, the interpretability of the model was increased and that innovation ability has a greater contribution to STT training quality.

In the third round of iteration, the actual application skill (A3) was introduced into the model, the R value of the model was increased to 0.688, the R^2 is 0.425, and the adjusted R^2 is 0.462, indicating that the actual application skill has a great power in interpreting the training quality of STTs and that the addition of this index further enhanced the interpretability of the model.

In the fourth round of iteration, teamwork and communication ability (A4) was brought into the model, the R value of the model is 0.684, the R2 is 0.469, and the adjusted R^2 is 0.405, indicating that this index has a good interpretability for STT training quality.

In the fifth round of iteration, the degree of industry-education integration (A5) was introduced into the model, the R value of the model is 0.552, the R2 is 0.327, and the adjusted R^2 is 0.410, indicating that the degree of industry-education integration also has a great power interpreting the training quality of STTs and that adding this index further enhanced the interpretability of the model.

Next, the variance of the proposed EIS was analyzed under stepwise regression strategy, and the following conclusions were drawn based Table 4.

In the first round of iteration, the regression sum of squares is 65.142, the residual sum of squares is 162.395, and the total sum of squares is 148.273; the F-value is 125.639, and the level of significance is 0.002, which is much lower than the significance level of 0.05, indicating that in the first model, the independent variables have a significant influence on the dependent variable.

In the second round of iteration, the regression sum of squares is 72.415, the residual sum of squares is 116.395, the total sum of squares is 135.284; the F-value is 174.036, and the level of significance is 0.001, which is much lower than the significance level of 0.05, indicating that in the second model, the independent variables have a greater influence on the dependent variable.

In the third round of iteration, the regression sum of squares is 85.417, the residual sum of squares is 162.359, the total sum of squares is 158.374; the F-value is 85.419, and the level of significance is 0.095, which is slightly higher than the significance level of 0.05, indicating that in the third model, the influence of independent variables on the dependent variable is not significant.

In the fourth round of iteration, the regression sum of squares is 81.625, the residual sum of squares is 169.341, the total sum of squares is 152.847; the F-value is 66.395, and the level of significance is 0.058*e*, which is slightly higher than the significance level of 0.05, indicating that in the fourth model, the influence of independent variables on the dependent variable is not significant.

In the fifth round of iteration, the regression sum of squares, the residual sum of squares, and the total sum of squares were all increased, but the F-value and the level of significance were not given, so the significance could not be judged and more information is needed to analyze the effect of the fifth model.

Table 4. Variance analysis

Model		Sum of Squares	df	Mean Square	F	Significance
1	Regression	65.142	1	63.254	125.639	0.002
	Residual	162.395	314	0.314		
	Total	148.273	325			
2	Regression	72.415	2	32.417	174.036	0.001
	Residual	116.395	369	0.396		
	Total	135.284	384			
3	Regression	85.417	3	25.596	85.419	0.095
	Residual	162.359	301	0.315		
	Total	158.374	324			
4	Regression	81.625	4	29.625	66.395	0.058
	Residual	169.341	328	0.328		
	Total	152.847	391			
5	Regression	83.157	5			
	Residual	177.342	311			
	Total	138.679				

5 CONCLUSION

This study explored the problem of STT training quality evaluation. First, the STT training quality control was discussed to ensure the evaluation criteria could be implemented during the talent-training process; then an EIS was created for STT evaluation with weight values assigned to each index by the entropy method, and the gray comprehensive evaluation method was employed for the said evaluation task. After that, a survey was carried out to investigate the capabilities should be possessed by STTs. The correlation coefficients of each evaluation index were analyzed, one-way ANOVA of STT training quality control was carried out, and the conclusion that innovation ability has a great influence on STT training quality was drawn. Next, a regression model of five iterations was constructed, variance analysis and a significance test of regression coefficients was performed, and the experimental results were analyzed. Finally, the STT training quality control was subjected to colinearity diagnostics, and it was concluded that special attention needs to be paid to the relationship between these variables during STT training to reduce the influence of multicolinearity on regression analysis.

6 REFERENCES

[1] Yanti, D., Sibarani, R., Purwoko, A., Emrizal. (2023). Tourism potential and how about its sustainability (Case study on Sibandang Island). International Journal of Sustainable Development and Planning, 18(2): 483–495. https://doi.org/10.18280/ijsdp.180217

[2] Widarti, E., Suyoto, S., Emanuel, A.W.R. (2020). Mobile application design for heritage tourism uses gamification approach in Indonesia. International Journal of Engineering Pedagogy, 10(5): 89–102. https://doi.org/10.3991/ijep.v10i5.13205

[3] Lei, K., Tian, L. (2023). Design and implementation of smart tourism scenic spot monitoring system based on STM32. In the 5th International Conference on Cyber Security Intelligence and Analytics (CSIA 2023), Shanghai, China, pp. 116–128. https://doi.org/10.1007/978-3-031-31860-3_13

[4] Firdaus, Hardjosoekarto, S., Lawang, R.M.Z. (2021). The role of local government on rural tourism development: Case study of Desa Wisata Pujonkidul, Indonesia. International Journal of Sustainable Development and Planning, 16(7): 1299–1307. https://doi.org/10.18280/ijsdp.160710

[5] Prakasa, F.B.P., Radja, M., Suyoto, S. (2020). User experience based mobile application design for boat loaning at marine tourism in Indonesia. International Journal of Interactive Mobile Technologies, 14(04): 86–102. https://doi.org/10.3991/ijim.v14i04.11227

[6] Kontogianni, A., Alepis, E. (2022). AI, blockchain & cyber tourism joining the smart tourism realm. In 2022 13th International Conference on Information, Intelligence, Systems & Applications (IISA), Corfu, Greece, pp. 1–6. https://doi.org/10.1109/IISA56318.2022.9904393

[7] Fan, H. (2021). Research on Hubei tourism talent demand and university tourism education training model based on computer big data mining technology. Journal of Physics: Conference Series, 1744(3): 032090. https://doi.org/10.1088/1742-6596/1744/3/032090

[8] Zhao, L. (2021). Research on the talent training mode of integrated development of logistics and tourism under the background of "new business". In 2021 International Conference on E-Commerce and E-Management (ICECEM), Dalian, China, pp. 20–23. https://doi.org/10.1109/ICECEM54757.2021.00012

[9] Mo, Z. (2021). Research on tourism English talent training system based on OBE and iceberg model from the perspective of industry-education integration. In 2021 2nd Artificial Intelligence and Complex Systems Conference, Bangkok, Thailand, pp. 225–229. https://doi.org/10.1145/3516529.3516570

[10] Zhao, H. (2021). Diversified education strategies and objectives for advanced tourism talents. International Journal of Emerging Technologies in Learning, 16(20): 148–162. https://doi.org/10.3991/ijet.v16i20.26513

[11] Tian, J., Lu, Y. (2014). Research on the application of innovative "order-oriented" talent cultivation mode in the cultivation of talents for tropical marine sports tourism of China. In 2014 IEEE Workshop on Advanced Research and Technology in Industry Applications, Ottawa, Canada, pp. 567–572. https://doi.org/10.1109/WARTIA.2014.6976323

[12] Luo, C., Chen, H., Yu, T. (2020). The construction strategy of talent cultivation system for tourism informatization in the era of Internet+. Journal of Physics: Conference Series, 1578(1): 012019. https://doi.org/10.1088/1742-6596/1578/1/012019

[13] Lemy, D.M., Pramono, R., Juliana. (2022). Acceleration of environmental sustainability in tourism village. International Journal of Sustainable Development and Planning, 17(4): 1273–1283. https://doi.org/10.18280/ijsdp.170425

[14] Zhao, H. (2021). Diversified education strategies and objectives for advanced tourism talents. International Journal of Emerging Technologies in Learning, 16(20): 148–162. https://doi.org/10.3991/ijet.v16i20.26513
[15] Bahtiar, A.R., Segara, A.J.T., Suyoto, S. (2020). Design of smart gamification in village tourism: An Indonesian case study. International Journal of Engineering Pedagogy, 10(1): 82–93. https://doi.org/10.3991/ijep.v10i1.11522
[16] Chen, C., Wu, T. (2022). Application of knowledge chain in the construction of online tourism education resources. International Journal of Emerging Technologies in Learning, 17(07): 80–93. https://doi.org/10.3991/ijet.v17i07.30401
[17] Chai-Arayalert, S., Sansompron, N., Chodchuang, S., Chantanaphant, J., Duangjan, C. (2023). Digital platform-mediated tourism system in small-town destination. International Journal of Interactive Mobile Technologies, 17(05): 143–161. https://doi.org/10.3991/ijim.v17i05.36835

7 AUTHORS

Xiangpeng Chang earned a Master's degree in Engineering from Wuhan University of Technology and has been working in Shijiazhuang University of Applied Technology since 2001. His main field of research is business management of tourism and hotels and related laws and regulations (e-mail: 2001000251@sjzpt.edu.cn; ORCID: https://orcid.org/0009-0003-3422-0351).

Shanshan Wang graduated from Hebei University of Technology with a master's degree. She is currently working at Shijiazhuang University of Applied Technology and focuses on business administration (email: 2017010823@sjzpt.edu.cn; ORCID: https://orcid.org/0009-0001-7343-0197).

Dong Ding graduated from Hebei University of Science & Technology with a master's degree. She is currently working at Shijiazhuang University of Applied Technology and focuses on business administration (email: 22018010870@sjzpt.edu.cn; ORCID: https://orcid.org/0009-0002-5004-8611).