A Structural Approach Towards Reinvigorating Student Satisfaction in Industrial Training Institutes – A Contemplating Outlook

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Abstract

The research paper focused to conceptualize and empirically test the conceptual model of student satisfaction proposed for Indian vocational education and training (VET), precisely industrial training institutes (ITIs). Even though the upgradation of ITIs through public - private partnership (PPP) is emphasized from the previous decade, little empirical evidence exists about the quality of the institutes. Improved quality in ITIs helps in increased employability of the students and would help in meeting India's projected skill demand of 191 million youths by 2022. Empirical data were collected from upgraded ITIs of Andhra Pradesh and Telangana states to assess student satisfaction. Student satisfaction gives the measure of student feedback on the quality of the courses. PLS - SEM was applied to develop measurement and structural models. Subsequently, statistical values were used to estimate the validity and reliability of the models. Besides, the predictive accuracy of the model was also tested. The data analysis assisted to ascertain whether to accept or reject the hypothesized relations proposed based on the conceptual model. The results proved that institute quality factors were positively correlated with student satisfaction. Eventually, it was observed that industry exposure was a significant determinant of student satisfaction followed by training facilities & equipment, trainer credibility, learning environment, and placement and counseling services. Above all being said, it can be posited that focusing on the above all quality factors would help in enhancing the quality of ITIs.

Keywords : **Vocational education and training, industrial training institutes, skill development, quality indicators, student satisfaction**

JEL Classification : I230, I240, I250

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Having 70% of the population into working age by 2025 is of great demographic advantage to any country and said so, India presently stands as the youngest nation in the world. At the same time, India is confronting a skill scarcity of the anticipated 300 million manpower by 2022, among them, 191 million youth has to obtain vocational education and training (VET) formally to fulfill the skill requirement (Mehrotra, 2014). In response to the burgeoning skill needs, the government has decided to upgrade Industrial Training Institutes (ITIs), which are the major drivers of VET in India. As of 2007, there were 1,896 government ITIs in the country ; of which 500 are proposed for upgrading into Centers of Excellence (COE) and the remaining, 1,396 are proposed to be upgraded as COEs through public-private partnership (PPP). This initiative is set to curb the negative image of ITIs conventionally characterized by low quality with obsolete and inadequate

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machinery, outdated curriculum, inadequate and lack of trained trainers, and lack of basic amenities for girl students (Tara et al., 2016). The main objectives behind PPP upgradation are : assessing the emerging skill requirements in the regions and producing the ITI graduates accordingly, updating the courses according to the labor market scenario, guiding students through placements, improving the networking among ITIs, assessing training requirements of the trainers, improving industrial exposure, and conducting skill competitions in the ITIs. Apart from the above objectives, PPP upgradation also aims to improve the image of VET courses by promoting them in schools and attracting potential candidates. The above objectives are aimed to enrich training quality and eventually boost the employability of the ITI students.

Despite the efforts, according to the Periodic Labor Force Survey report 2017 to 2018 (Government of India, 2019), formally trained VET participants in the age group of 15 – 59 years were only 2%, and in the non-formal sector, the figure was 6.1%. The percentage of VET participants in India is lower compared to industrialized countries like China, Japan, and Korea where the percentage varied from 68% to 96% (Agrawal & Agrawal, 2017). The low participation can be attributed to negative perception, social stigma, and cultural barriers attached to VET due to the caste system in India (Agrawal & Agrawal, 2017 ; Sharma & Nagendra, 2016). Furthermore, ITIs are plagued by high dropout rates.

Previous studies related to Indian government ITIs explored the factors through which ITIs influence employability (Neroorkar & Gopinath, 2019) and perceptions of students and parents regarding the attractiveness of ITIs (Ajithkumar & Pilz, 2019). Besides, studies have identified the issues and challenges in Indian VET and suggested the ways forward (Agrawal, 2012 ; King, 2012 ; Kumar et al., 2019 ; Sharma & Nagendra, 2016). However, empirical work investigating the quality of ITIs upgraded through PPP is very much limited. Further, the quality indicators of ITIs that potentially contribute to student satisfaction are still unexplored. There is a considerable research gap in this context. Therefore, this paper focuses to enhance the extant literature by examining the student perceptions about VET quality indicators (i.e., training equipment quality, trainer credibility, learning environment, industry exposure, placement and counseling services, and extracurricular activities) and the impact of these indicators on student satisfaction. Also, educational quality is the potential determinant of student satisfaction. As the VET quality and student satisfaction enhance students' persistence in the course and potentially reduce the dropout level, it is pertinent to address the subsequent research queries :

- What perceptions do students have on VET quality indicators ?
- How are the VET quality indicators related to student satisfaction ?

Against this background, we aim to bridge this crucial gap in the literature on VET. To address the research questions, we used student feedback collected through questionnaires. Student assessment of the course plays a significant part in the evaluation process. Also, partial least squares - structural equation modeling (PLS-SEM) is used to develop measurement and structural models. As the main part of this study, ITIs upgraded through PPP from Telangana and Andhra Pradesh were identified.

Literature Review

Student satisfaction within the context of an educational institution can be termed as a student's intellectual and emotional assessment of diverse aspects related to his/her educational encounters (Mark, 2013). It is an outcome of program quality and benefits associated with it. Student satisfaction reciprocates its advantages through positive word of mouth, increased student persistence, and the prospects of recommending the institution to peers (Alves & Raposo, 2009 ; Bright & Graham Jr., 2016). Students are more inclined to recommend the institute to peers when they perceive that the institute has played a significant role in preparing them for

employment. Nevertheless, there exists a direct link between students' employability and satisfaction (de Oliveira Silva et al., 2020). Evaluating student perceptions of the course experience is important as it helps in evaluation and boosting the course quality.

The evaluation of vocational education through student satisfaction ranged from 12 dimensions to four dimensions. Burnett and Clarke (1999) emphasized student satisfaction through 12 dimensions : satisfaction towards instructional quality, facilities, resources, design and delivery of the course, expectations of the student, student progress, learning outcomes, employment, attrition, course completion, and overall course satisfaction.

Ibrahim et al. (2014) stated eight dimensions of student satisfaction, which included campus environment, library facilities, support services, instruction delivery, and training facilities in common. The authors advocated for the attitude of management, curriculum, and physical facilities as antecedents of student satisfaction. Wang et al. (2019) posited four constructs for satisfaction, that is, teachers, course, teaching environment, and learners.

Training Facilities and Equipment (TFE)

Measurement of TFE quality emerges as one of the prominent aspects in training evaluation. Workshops occupy a prominent place in vocational education. They play a different role compared to a classroom setting, offering varied competencies by training in simulated/ real work environments. Tara et al. (2016) found that accommodating quality - training infrastructure that keeps up with the fast-changing demands of the industry along with other potential delivery systems helped in enhancing the positive outcomes of students in an industrial scenario as there exists a potential requirement for professional technicians. Burlakanti et al. (2014) stated that TFE enhances the reputation and desirability of VET. Also, good infrastructure along with well-trained and qualified faculty is an important aspect of educational quality. Ibrahim et al. (2014) stated that TFE is a significant determinant of student satisfaction. From the above discussion, we postulate the below hypotheses :

- **H01 :** Training facilities and equipment do not have an impact on student satisfaction.
- **Ha1 :** Training facilities and equipment have a positive impact on student satisfaction.

The above hypotheses are tested by adopting key measures from the literature (Ibrahim et al., 2014).

Trainer Credibility (TC)

Educational quality is appraised by the quality of its teachers (Kagaari, 2007). This was further supported by the views of Parker (2008) that the vocational program quality could be identified with a teacher's credibility in deploying the instructional activities innovatively. In line with this view, Roman (2014) posited that the quality of a teacher impacts the learning abilities of a student. The use of modern technology and innovative teaching methods that give real-time exposure to concepts drives the student's motivation to learn. Students' perception of teacher's openness to have a dialogue ; professional and personal experiences would enrich the instructional delivery positively, eventually improving students' academic performance (Knoell, 2012). Effective instructional delivery can be actuated by on-the-job training and frequent industrial visits to the teacher. Furthermore, the efficiency of a VET system is pronounced through its effective use of resources (trainers and facilities) and contributes to the large system (i.e., employability of the youth) (Pathak & Patwardhan, 2011). TC contributes to improving students' perception of the course. From the above discussion, we propose the following hypotheses :

- **H02 :** Trainer credibility does not have a positive association with student satisfaction.
- **Ha2 :** Trainer credibility has a positive association with student satisfaction.

The above hypotheses are tested by considering measures from Parker (2008).

Learning Environment (LE)

Parker (2008) emphasized engaging the students with guidance and thought-provoking questions, creating an amicable environment for two-way interaction, conducting team activities, and on the hands-training helps a teacher in the VET program to improve the learning experience of the students. These are the hallmarks of a successful vocational program. Regular feedback to students regarding their performance in learning tasks reduces the gap between observed and expected performance. This is facilitated through constructive communication between teacher and student (Roman, 2014). A collaborative learning environment imbibed with group efforts and analytical abilities enhance the students' learning appetite. Subsequently, students tend to align their career-related goals and requirements with that of teams. These dynamics mimic a real-time work setting. These characteristics mark the presence of potential learning environments. A potential learning environment enhances students' interaction with their environment. High perceptions of the students towards the learning environment play a pivotal role in student satisfaction (Placklé et al., 2018). Lenton (2015) emphasized that students are more satisfied with instructional delivery that depicts the sequence of events that match the real-time work environment. Building on the above discussion, the subsequent hypotheses are tested :

- **H03 :** The learning environment does not have an impact on student satisfaction.
- **Ha3 :** The learning environment has a positive impact on student satisfaction.

To test the present hypotheses, the key measures were obtained from Placklé et al. (2018).

Placements and Counseling Services (PCS)

Kagaari (2007) posited that informing students about employment trends and government policies equipped them with the ability to cope with employment challenges. Students perceive the value of the course through the placements they are offered. Students believe the skills attained from ITI contribute to self-sufficiency at the macro level. If they could not attain employment, industrial training is deemed to endow them with the skills for self-employment (Neroorkar & Gopinath, 2019). In this light, the role of counseling services is crucial. Counseling services prepare the students to face interviews, develop good work attitudes, and interpersonal relationships. Ibrahim et al. (2014) in a student satisfaction survey in Malaysian skills training institutes found that students paid attention to the counseling services offered in the institute, which included career guidance services and feedback. Counseling services had a major impact on program outcomes by improving workplace coordination and updating students about the job information. Harsolekar and Munshi (2018) posited that job profile and salary were the two most vital parameters considered by the students while evaluating the placement prospects of the institute. The discussion helps us to postulate that :

- **H04 :** Placement and counseling services do not have an association with student satisfaction.
- **Ha4 :** Placement and counseling services have a positive association with student satisfaction.

The critical measures for testing the above hypotheses are obtained from the literature (Kagaari, 2007).

In the current study, industry exposure and extracurricular activities are new constructs proposed as

antecedents to student satisfaction. With interactions from academicians, students, and employment officers, the constructs are found to be relevant for the study. In accordance with the literature, we propose that industry exposure and extracurricular activities positively influence student satisfaction.

Industry Exposure (IE)

The growing technological, globalization, and competitive challenges have put an inevitable need to alter the traditional classroom-based learning environments. Expanding the boundaries of learning from classroom to workplace has wiped off the divide between academy and work. Workplace learning has been structurally formalized to realize the practical nature of learning immediately. The benefits of learning and production are actualized immediately. Industry interaction prepares the vocational graduates for future job roles through on-the-job training, keeping them informed about the challenges they would face, and equipping them with competencies they require (Ajithkumar & Pilz, 2019 ; Ibrahim et al., 2014 ; Wang et al., 2019). Lectures by industry experts also help students understand the new paradigms in their chosen course. This helps reduce the gap between vocational schools and industry.

Menon (2002) emphasized that students are inclined to the practical orientation towards the work than theory-driven learning. Wang et al. (2019) further reinforced that students reported learning satisfaction when they were subject to collaborative teaching by industry experts (Kagaari, 2007).

- **H05 :** Industry exposure does not have a positive impact on student satisfaction.
- **Ha5 :** Industry exposure has a positive impact on student satisfaction.

To test the above hypotheses, we considered key measures from literature (Kagaari, 2007) and discussion with experts.

Extracurricular Activities (EA)

EA encompasses skill contests, craftsman events, and symposia that facilitate student motivation, improved academic performance, exposure, student involvement and networking (Muscalu & Dumitrascu, 2014). It benefits a self-employed person to procure the machinery on subsidies and gain prospective clients (Agrawal & Agrawal, 2017). Muscalu and Dumitrascu (2014), in a study carried out in different universities in Germany and Rome, found that Romanian students felt that the participation in extracurricular activities was important, as it helped in shaping their attitudes, prepared them for future challenges, helped in socialization, promoted leadership skills, improved academic experience, and enhanced professional experience. Also, networking specifically through social networking sites bestows collective benefit to students by transforming their way of learning and interactions with peers (Giri et al., 2018). Extracurricular activities contribute significantly to student satisfaction. Organizing extracurricular activities enhances the desirability of the institute. In line with the viewpoints, the following hypotheses are being formulated :

- **H06 :** Extracurricular activities do not have an association with student satisfaction.
- **Ha6 :** Extracurricular activities have a positive association with student satisfaction.

To examine the above hypotheses, we considered the key measures from the literature (Muscalu & Dumitrascu, 2014) and discussion with experts.

Purpose of the Study

Building on the above-mentioned discussion, the objectives of the present research are to :

(1) Propose a conceptual model for student satisfaction in ITIs consisting of the independent variables (quality indicators) and the outcome variable (student satisfaction) based on literature.

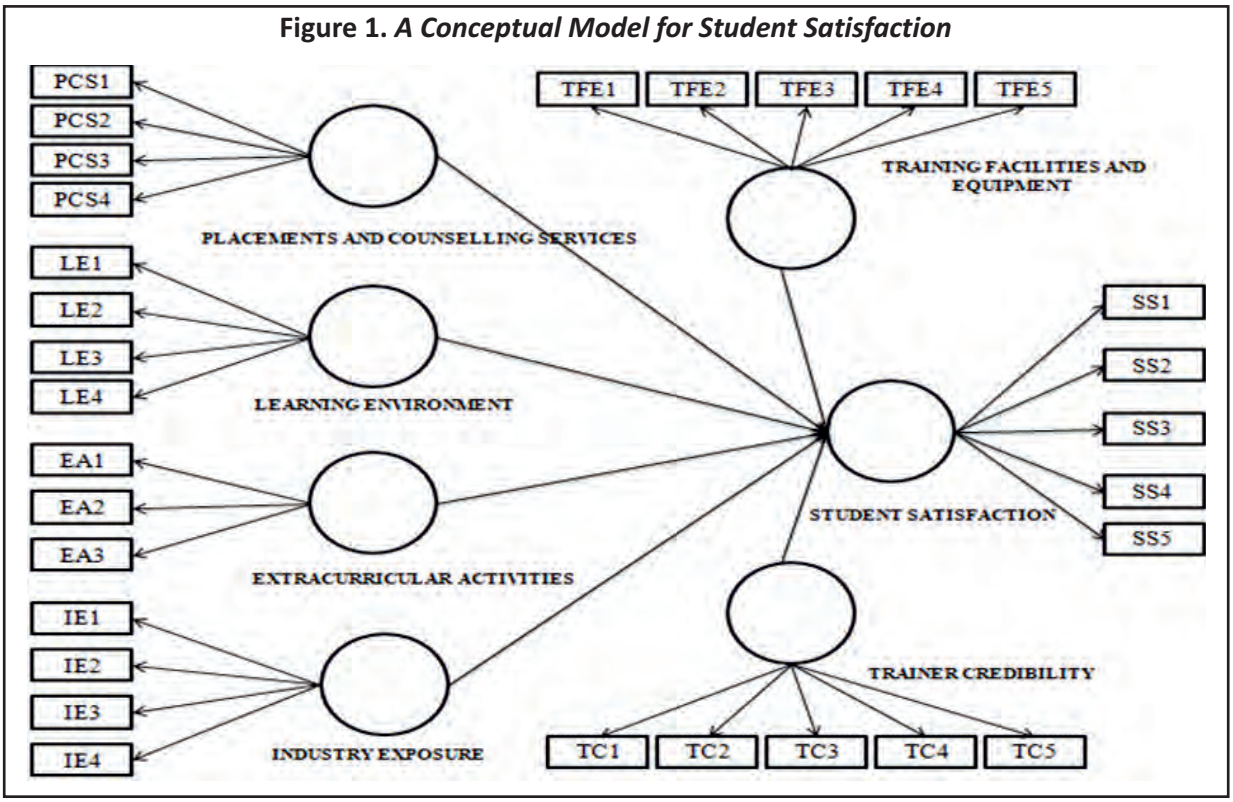
(2) To empirically test the reliability and validity of the structural model.

(3) To defend the proposed relationships between quality indicators and student satisfaction.

Conceptual Model

Based on the literature discussed, the conceptual model consists of six independent variables (quality indicators) and one outcome variable (Figure 1 outlines the conceptual model for student satisfaction). The antecedents include training facilities and equipment (TFE), trainer credibility (TC), learning environment (LE), placement and counseling services (PCS), industry exposure (IE), and extracurricular activities (EA). The outcome variable is student satisfaction (SS).

Figure 1. ***A Conceptual Model for Student Satisfaction***



Research Methodology

The questionnaire was developed by reviewing the existing body of literature. We reviewed the PPP upgradation objectives of India to confirm whether the questionnaire fit the country context under investigation

(Gallifa & Batallé, 2010). A 5-point Likert scale was employed to assess the items in the questionnaire. Extant research (Fishbein & Ajzen, 1974) suggests that the Likert scale captures the beliefs and cognitions of respondents effectively. For example, researchers like Ibrahim et al. (2014), Placklé et al. (2018), and Wang et al. (2019) used a 5 - point Likert scale for examining student satisfaction in VET.

Sampling and Data Collection

We visited the official website of the Director-General of Training and retrieved the list of ITIs upgraded through PPP. Information related to ITIs and their principals was obtained from the respective websites. A survey instrument was developed and was subjected to pretest with academicians and VET practitioners. The revisions were made accordingly. The empirical investigation was done in Andhra Pradesh and Telangana states from March – May 2019. The data collection took place within the scheduled time of ITIs and hence it resulted in 100% participation. Overall, 392 students from first and second-years took part in the study. We investigated the research questions at the end of their respective courses for better responses. The missing responses accounted for 2%, which were imputed through multiple imputation techniques to evade any risk of bias (Peugh & Enders, 2004). Before this, the patterns of missing data were analyzed to avoid any missing response bias.

We examined for common method bias by running Harman's one-factor test. This yielded a single factor explaining 24.38%, which was further supported by examining the variance inflation factor (VIF) scores also, which resulted in scores below 3.3, indicating the absence of the common method bias (Kock & Hadaya, 2018).

Measurement Model Validity and Reliability

Kaiser – Meyer – Olkin (KMO) test was run to investigate the adequacy of the sample for factor analysis. The test revealed a satisfactory KMO value (KMO = 0.84) suggesting reliability and validity checks on construct loadings. To meet the study objectives, we employed partial least squares structural equation modeling (PLS - SEM). PLS-SEM is prominently used in different spheres of business management, besides international business research and strategic management research to analyze the conceptual relationships. Jöreskog and Wold (1982) stated that the "causal-predictive" nature of partial least squares structural equation modeling aids researchers to keep up with both explanation and prediction (Shmueli, 2010) ; whereas, the hypothetical assumptions and the subsequent path model explicate the causal nature, and the current study envisages high acuteness in prediction, which would be of high practical relevance. Hence, this approach is the interplay of both causal and predictive nature.

For the current study, the construct reliability scores are measured through ρ_A , proposed by Dijkstra and Henseler (2015). ρ_A is considered as a precise estimate of construct reliability. It lies between Cronbach's alpha and composite reliability, where the scores are computed according to the formula given by Dijkstra and Henseler (2015). The values lie between 0.712 – 0.859, which is higher than the suggested value of 0.707. The convergent validity is estimated by average variance extracted (AVE). AVE above 0.5 indicates that the constructs under the study hold convergent validity. The AVE values are estimated by taking the average of the squared loadings of each indicator on a latent construct. The constructs' AVE estimates are above the threshold measures [0.526, 0.611]. The item reliability of each construct is measured through loadings. Table 1 exhibits the parameters and reliability measures of the model. The indicator loadings lie in between 0.702–0.858. The suggested threshold estimate is 0.708 (Hair et al., 2019). Item *TC2* (loading = 0.702) is retained due to its conceptual importance in the construct.

Traditionally, Fornell – Larcker test and cross-loadings were used to test the discriminant validity. Both the tests are likely to compound item loadings because of their dependence on composites. Hence, examining

Table 1. ***Measurement Model Evaluation***

	Code	Indicator	ρ_A	AVE	VIF	Weight	Loading
Training Facilities and Equipment *(TFE)*	*TFE1*	Training equipment is adequate.	0.859	0.611	1.582	0.245*	0.722*
	TFE2	Training equipment is advanced.			2.109	0.282*	0.835*
	TFE3	The quality of the training equipment is good.			2.246	0.293*	0.845*
	TFE4	The training equipment is maintained well.			1.685	0.250*	0.725*
	TFE5	Workshop space is sufficient to carry out practicals by the students.			1.751	0.292*	0.796*
Trainer Credibility *(TC)*	*TC1*	Trainers make use of modern technology that helps us get real-time exposure.	0.813	0.565	1.749	0.295*	0.801*
	TC2	Trainers are helpful.			1.448	0.234*	**0.702***
	TC3	Trainers are available when I'm needful.			1.473	0.27*	0.719*
	TC4	Trainers help develop a career plan.			1.626	0.367*	0.818*
	TC5	Trainers have industrial experience.			1.452	0.241*	0.712*
Industry Exposure *(IE)*	*IE1*	Industrial visits were adequate enough to provide real time exposure.	0.745	0.57	1.397	0.323*	0.742*
	IE2	We are given lectures by industrial experts.			1.501	0.367*	0.795*
	IE3	I participate in industry-specific events, seminars, and conferences.			1.298	0.29*	0.725*
	IE4	I participate in on-the-job training for the course I have enrolled in.			1.417	0.352*	0.766*
Placements and Counseling Services *(PCS)*	*PCS1*	I am guided about employment opportunities in my region.	0.742	0.561	1.436	0.296*	0.728*
	PCS2	I am guided about the self-employment schemes initiated by the government.			1.338	0.467*	0.805*
	PCS3	The pre-placement training honed my skills for future employment prospects.			1.246	0.276*	0.725*
	PCS4	The placement prospects for the institute are satisfactory.			1.391	0.32*	0.733*
Learning Environment *(LE)*	*LE1*	I am given feedback on learning tasks and tests.	0.752	0.526	1.123	0.402*	0.728*
	LE2	I can express my doubts openly in the classroom.			1.22	0.394*	0.716*
	LE3	The problem-solving tasks are done through teamwork.			1.104	0.394*	0.716*
	LE4	The learning tasks are interesting.			1.18	0.465*	0.742*
Extracurricular Activities *(EA)*	*EA1*	I interact and network with students of other ITIs.	0.705	0.589	1.118	0.387*	0.722*
	EA2	I participate in skill competitions.			1.192	0.372*	0.713*
	EA3	I participate in events for tradesmen.			1.289	0.585*	0.858*

Student Satisfaction (SS)	*SS1*	I'm satisfied with the entire course experience in ITI.	0.762	0.583	0.719*
	SS2	I'm satisfied with the decision of selecting this institute.			0.713*
	SS3	I would like to continue further education in the vocational stream.			0.829*
	SS4	I recommend the institute to relatives/ friends.			0.744*
	SS5	The prior expectations of the program are met.			0.808*

Notes. 1. $\rho_A := (\widehat{w}'\widehat{W}\widehat{w})^2 \cdot \frac{\widehat{w}'(S - \text{diag}(S))\,\widehat{w}}{\widehat{w}'(\widehat{w}\,\widehat{w}' - \text{diag}(\widehat{w}\,\widehat{w}'))\,\widehat{w}}$ (Dijkstra & Henseler, 2015).

2. $AVE\varepsilon_j = \frac{\Sigma^{kj}_{k=1}\lambda^2_{jk}}{\Sigma^{kj}_{k=1}\lambda^2_{jk} + (\Theta)_{jk}}$ (Dijkstra & Henseler, 2015).

Note. * $p < 0.05$, one-tailed test.

Table 2. ***Heterotrait – Monotrait Ratio***

	EA	*IE*	*LE*	*PCS*	*SS*	*TC*	*TFE*
EA							
IE	0.45						
LE	0.4	0.564					
PCS	0.12	0.484	0.5				
SS	0.39	0.628	0.65	0.59			
TC	0.39	0.505	0.6	0.39	0.69		
TFE	0.34	0.488	0.48	0.31	0.73	0.613	

Notes. 1. $HTMT_{ij} = \frac{1}{K_i K_j}\sum^{K_i}_{g=1}\sum^{K_j}_{h=1} r_{ig,jh} \left(\frac{2}{K_i(K_i\text{-}1)}\sum^{K_i\text{-}1}_{g=1}\sum^{K_i}_{h=g+1} r_{ig,ih} \frac{2}{K_j(K_j\text{-}1)}\sum^{K_j\text{-}1}_{g=1}\sum^{K_j}_{h=g+1} r_{jg,jh} \right)^{\frac{1}{2}}$

(Henseler et al., 2015).

Table 3. ***Construct Correlation Matrix and Descriptive Statistics***

TFE	*TC*	*IE*	*PCS*	*LE*	*EA*	*SS*	
TFE	1						
TC	0.49	1					
IE	0.381	0.388	1				
PCS	0.409	0.492	0.419	1			
LE	0.2	0.262	0.314	0.323	1		
EA	0.219	0.259	0.292	0.263	0.007	1	
SS	0.574	0.525	0.654	0.481	0.339	0.261	1
Mean	3.3	3.6	2.6	3.9	4.17	2.9	3.73
SD	1.06	0.99	1.04	0.62	0.41	1.01	0.71

discriminant validity using these tests proved to be inefficient in variance-based structural equation modeling (SEM) (Rönkkö & Evermann, 2013). These limitations are overcome by the heterotrait – monotrait method (HTMT). Henseler et al. (2015) suggested HTMT as an efficient measure of discriminant validity. It estimates the mean of the correlations of items across all constructs assessing diverse concepts (heterotrait – heteromethod)

to the mean of the correlations of items in a single construct (monotrait – heteromethod). Since at least two monotrait – heteromethod submatrices are generated, the geometric mean of the mean correlations of the sub-matrices is taken. HTMT estimates are dependent on correlation matrices, rather than on raw score, factor analysis, or factor loadings (Henseler et al., 2015). The HTMT estimates below 0.85 are recommended when there is no conceptual similarity among the constructs (Henseler et al., 2015). Table 2 summarizes the HTMT estimates. The HTMT values in the study are observed to be less than 0.73. Also, Table 3 outlines estimates of construct correlations and descriptive statistics.

Analysis and Results

Estimating the Overall Fit of the Structural Model

PLS-SEM is used to predict the target construct and discover the key driver constructs (Hair et al., 2016). Smart PLS Version 3 is used for this purpose. The model fit values are assessed by running a bootstrap procedure, which gave a measure of discrepancy between variance-covariance matrices of the observed model and variance-covariance matrices of the estimated model. This is measured through geodesic distance (d_G), squared Euclidean distance (d_{ULS}), and *SRMR*. SRMR gives a measure of overall model fit. The model fit indices are outlined in Table 4. The values of the discrepancy measures are below the upper bound of the 95% quantile reference range. This indicates that the model is a good fit (*SRMR* = 0.038, d_{ULS} = 0.852, d_G = 0.325, *RMS_theta* = 0.621). Further, SRMR values are below 0.08 (Dijkstra & Henseler, 2015) and *RMS_theta* < 0.12 (Henseler et al., 2014).

The path coefficients are the standardized regression coefficients. Table 5 indicates that the path weights of the hypothesized relationships vary between 0.102 to 0.396. As per hypothesis Ha1, a significant association

Table 4. ***Model Fit Indices***

Model Fit Indices	Values	Ub95
SRMR	0.038	0.054
d_{ULS}	0.852	1.333
d_G	0.325	0.401
RMS_theta	0.621	

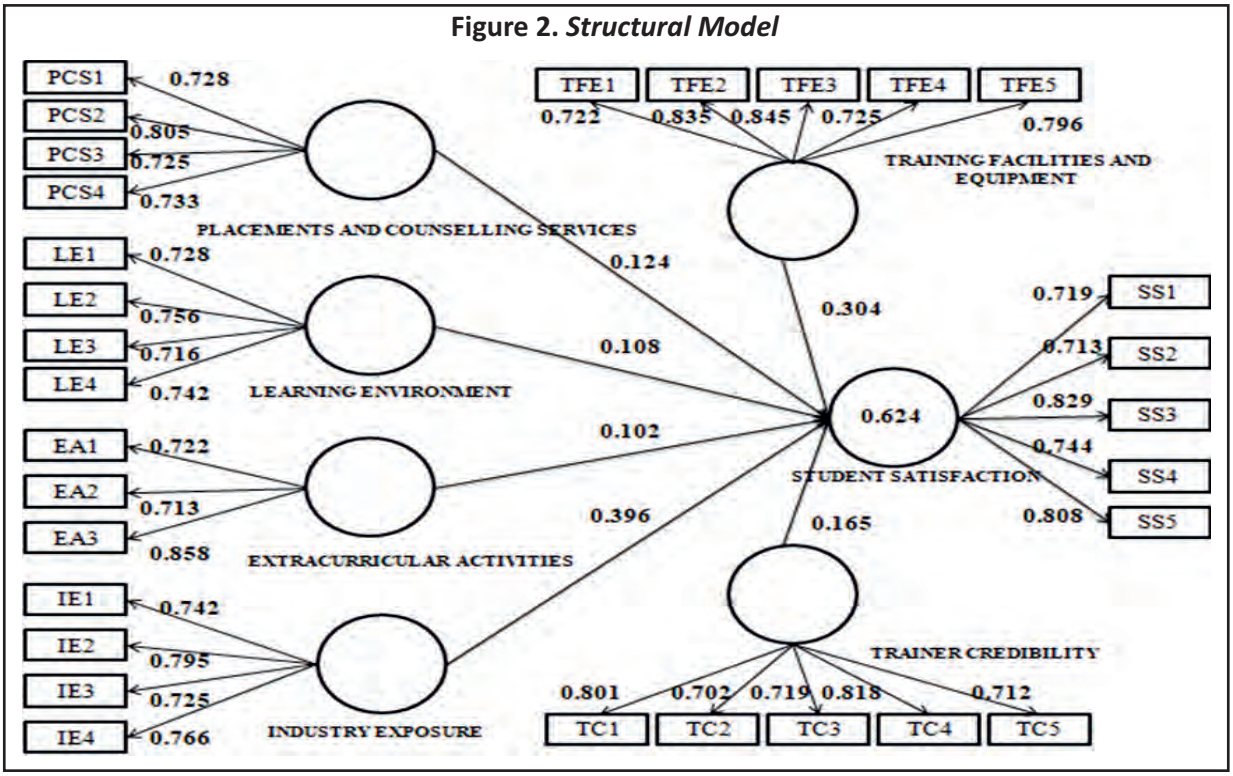
Note. UB95 is the upper bound 95% confidence interval.

Table 5. ***The Explanatory Power of the Model***

Relationships				Coefficient	*t* - value	CI	*p* - value
TFE	→	*SS*	(H1)	0.304*	7.432	[0.228 , 0.390]	.000
TC	→	*SS*	(H2)	0.165*	3.824	[0.077 , 0.249]	.000
LE	→	*SS*	(H3)	0.108*	3.403	[0.066 , 0.197]	.000
PCS	→	*SS*	(H4)	0.124*	2.032	[0.005 , 0.171]	.000
IE	→	*SS*	(H5)	0.396*	11.24	[0.331 , 0.456]	.000
EA	→	*SS*	(H6)	0.102	1.05	[0.064 , 0.165]	.365
Endogenous Variable				R^2			
Student Satisfaction				0.624			

Note. * $p < 0.05$, one tailed test.

Figure 2. ***Structural Model***



exists amidst TFE and SS (β = 0.304, *t* = 7.432). Hence, H01 is rejected. Table 2 presents that Ha2 is supported and there is a significant association between TC and SS (β = 0.165, *t* = 3.824). This implies that TC plays a significant role in the student learning process, thereby positively impacting student satisfaction (Plackle et al., 2018). Therefore, H02 is rejected. Ha3 shows that LE has a significant role in student satisfaction (β = 0.108, *t* = 3.403). This finding supports the view that high perceptions of students towards LE play a significant role in SS (Plackle et al., 2018). Hence, H03 is rejected. It is observed from the hypothesized relation Ha4 that PCS has a significant role in student satisfaction (β = 0.124, *t* = 2.032), and hence, the hypothesis is supported. This is not surprising as it reinforces the views of prior research (Neroorkar & Gopinath, 2019) that PCS plays a crucial role in imparting skills for employment and self-employment. This further supports the view that there exists a direct link between employability and student satisfaction (Silva et al., 2020). Therefore, H04 is rejected. The hypothesized relation Ha5 shows that IE has a significant role in student satisfaction (β = 0.396, *t* = 11.24). The finding confirms Menon's (2002) viewpoint that students prefer practical inclination, therefore, improving the learning contentment (Wang et al., 2019). Hence, H05 is rejected. Further, there does not exist a significant connection amidst EA and SS (β = 0.102, *t* = 1.05). Hence, we fail to reject H06. This finding confirms the views of Muscalu and Dumitrascu (2014) that unfavorable perception of students towards EA can be due to low involvement of students in EA and lack of information. This view tends to be supported by the mean score of EA (*M* = 2.9), which indicates very low participation. Therefore, we fail to reject H06.

The variance inflation factor (VIF) estimates of the exogenous constructs are estimated to assess multicollinearity. Presence of multicollinearity biases the regression results. Values are below 3, which indicates that there is no multicollinearity (Hair et al., 2019). VIF values are summarized in Table 1.

Figure 2 exhibits the structural model. The R^2 of the model measures the in-sample explanatory power of student satisfaction. The value in the model is 0.624. The study of student satisfaction in VET in the Indian context is in its nascent stage. Ibrahim et al. (2014) stated an R^2 value of 56.7% for an empirical study on student

Table 6. ***Effect Size***

Relationships				f^2
TFE	→	*SS*	(H1)	0.162
TC	→	*SS*	(H2)	0.157
LE	→	*SS*	(H3)	0.028
PCS	→	*SS*	(H4)	0.152
IE	→	*SS*	(H5)	0.29
EA	→	*SS*	(H6)	0.022

Table 7. ***The Predictive Power of the Model***

	PLS - SEM OUTCOME			LM OUTCOMES		
	RMSE	MAE	MAPE	RMSE	MAE	MAPE
SS1	0.482	0.381	9.577	0.537	0.421	10.493
SS2	0.582	0.402	12.116	0.613	0.499	12.294
SS3	1.02	0.866	46.728	1.104	0.878	47.649
SS4	0.901	0.737	28.797	0.982	0.791	33.014
SS5	0.752	0.632	22.998	0.81	0.643	23.801

satisfaction in VET. Reviewing the variance scores reported in extant investigations on student satisfaction in VET research, the 62.4% R^2 value is an excellent score.

The f^2 values calculate the effect sizes of the exogenous constructs on the model. The larger the effect size, the more dominant is the role of the construct in the model. All the effect sizes of the constructs in the model range from 0.022 – 0.29, that is, from weak to moderate. Table 6 includes the f^2 values.

Table 7 shows that the theoretically established model has a predictive error. The prediction errors of PLS-SEM, that is, root mean squared error (RMSEA), mean absolute error (MAE), and mean absolute percentage error (MAPE) are lower than the linear regression model (LM Model) error statistics. As all the error estimates of the endogenous construct indicators of the PLS-SEM model are below the LM – model, it connotes high predictive accuracy for the model (Sharma et al., 2021 ; Shmueli et al., 2016).

Discussion, Conclusion, and Theoretical Implications

The current study has proposed a conceptual model on student satisfaction in VET, identifying the relationships among training facilities and equipment, trainer credibility, industry exposure, placement and counseling services, extracurricular activities, learning environment, and student satisfaction. The model is empirically tested. The study was undertaken on 392 students from ITIs of India. We used the PLS-SEM to investigate the hypotheses. The results of the investigation aim to enhance the extant literature on VET. Hypothesis Ha1 reveals that TFE has a significant association with SS. In contrast, Douglas et al. (2006) stated that TFE was not a potential predictor of SS. One practical explanation came from Ibrahim et al. (2014) that TFE might not significantly contribute to SS in developed countries as a majority of the institutes are provided with quality infrastructure. As India is an emerging nation and not all educational institutions possess state-of-the-art facilities, the availability of advanced and quality training facilities and equipment encourage students to participate in VET. This further brings down the students' dropout rate.

Besides, results suggest that Ha2 is supported. TC is significantly associated with SS. This indicates that the trainers potentially influence LE. The proficiency of the trainers in imparting pedagogy through practical orientation and interactivity influences learner satisfaction. This finding affirms the results of extant research, including Plackle et al. (2018), who stated that teachers occupied a vital role in designing LE and on-the-job training to the teachers kept them updated on recent technologies. Hence, the management of ITIs should identify the needs of trainers regularly and train them. From the hypothesized relation H3, it is observed that LE impacts SS. Contrary to the findings, some of the literature revealed that LE did not play a significant role in SS (Ibrahim et al., 2014). This drew an explanation from Plackle et al. (2018) that students' perceptions of the learning environment played a significant part in SS. Collective learning and systemic feedback on learning activities enhance the students' perceptions towards LE quality.

Further, Ha4 connotes that PCS has a significant association with SS, thus suggesting the need for career guidance on employment and self-employment prospects to students. Preparing the students for placements promotes self-confidence and self-efficacy that helps them during interviews. This affirms the viewpoints of prior research (Kagaari, 2007 ; Neroorkar & Gopinath, 2019). The collaboration of ITIs and industries in pre-placement and counseling services can help improve the employment prospects of students. Similarly, from Ha5,IE is found to have a significant impact on SS. This finding implies that students prefer workplace learning and collaborative teaching from industry experts. This finding supports the views of Wang et al. (2019). Industry linkages should drive the learning in ITIs to promote employability skills and satisfaction of the students. Ha6 reveals there does not exist a significant association between EA and SS. This finding contradicts the viewpoints of extant literature. However, Muscalu and Dumitrascu (2014) rationally put forward that inadequate information on EA reduces its prominence in the learning procedure. Organizing varied attractive extra-curricular activities improve the students' perceptions of EA.

The current research is a novel contribution to student satisfaction research in the Indian context. The present study focuses on skilling practices that VET practitioners can exploit for the benefit of their stakeholders, that is, students, parents, institutes, and industries. Understanding the market demand and the learning needs of students helps the VET practitioners in deploying the skilling strategies effectively.

Managerial Implications

The upgraded ITIs need improvization in the quality factors as identified by the study. The study implies the need for a more collaborative approach by the industry and institute to satisfy the learning requirements of the students. Extending the role of IMC beyond financial matters and procurement of the machinery is essential. Institutes that are located in industrial areas have two to three industrial lectures in an academic year. ITIs in rural areas do not benefit much from their industry partner as they are not close to the industrial cluster. The government can provide transportation facilities to students and industry partners for easy commuting. A few industry partners and attached institutes do not share commonalities in terms of industry operations and trades in the institutes, and subsequently, students are not provided any expert lectures. Small firms, mostly operating with less than 50 employees, may struggle with a lack of incentives and resources to adopt an ITI and transfer skills ; in such a scenario, industry inclusiveness is still a challenge. Private participation in skill development requires scalability and resources to adopt an ITI, which is possible only by the major players. In such a case, the Indian government can incentivize such smaller firms. We, upon conversation with training officers (TOs), affirmed the requirement for periodic training on current trends in trades and communication skills. The Craft Instructor Training Scheme (CITS), taken once in the initial days of the career, could not suffice to their ongoing training needs.

The great concern of ITIs is a requirement of Assistant TOs since many senior trainers are retiring. The current trainers, hired on a contract basis, lack trade expertise and are burdened with the number of subjects they handle.

There is an imminent need for the Indian government to issue recruitment notifications for trainers. Most of the institutes lack a formal placement cell. Setting up a placement cell is imminent to guide students on self-employment schemes in addition to guiding for employment and apprenticeship programs. The current study has revealed that learning driven by industry-institute linkage, formalization of workplace learning, as well as adequate and trained trainers would help realize the benefits of skills training immediately. Tara et al. (2016) posited that these form the critical factors for an effective skills transfer. Organization of diverse EA and skill competitions at state, national, and world levels would set India's skill institutes' (ITIs) standards competing at the world stage. Publicizing the benefits of enrolling courses in ITI in secondary schools through school teachers and the local community through immediate tangible evidence helps in improving the attractiveness of the ITIs. The study advocates for developing a holistic quality assessment system for each institute by collecting feedback from students, trainers, and industrial experts from time to time. Feedback from industry experts regarding the performance of students on the job can play a key role in improving the skills transfer.

Limitations of the Study and Scope for Future Research

Every study is prone to certain limitations and coming to the present study, it provides useful insights to VET practitioners and researchers. It has constraints and there are reasonable prospects for future research. The study is confined to two states. Future studies can extend the research to a wider scale for confident generalizations. Students' prior motivation in choosing the course can have a significant influence on student perceptions of quality and satisfaction. This can be accomplished through a questionnaire to study various motivational profiles of the students. The current study identified six quality indicators that lead to student satisfaction. Future research can be explored by identifying other quality dimensions that would enhance overall student satisfaction.

Authors' Contribution

Ms. Garimidi Siva Sree identified the research gap and developed a research design to undertake the empirical study. She conducted a systematic literature review and extracted research papers with high repute and refined these based on keywords relevant to the study design. Dr. Ramlal Porika verified the methodological part and supervised the study. The data collection was done through questionnaires by Garimidi Siva Sree. She did the numerical computations using SPSS 21.0. She wrote the manuscript in consultation with Dr. Ramlal Porika.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter, or materials discussed in this manuscript.

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