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THE IMPACT OF VOCATIONAL SCHOOLS ON THE LABOR MARKET IN KYRGYZSTAN

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Abstract

This study addresses the issues regarding the technical and vocational schools in Kyrgyzstan. The study aims to determine the contribution of vocational high schools to the labor market in Kyrgyzstan. In this study, the primary hypothesis of this study is to show that if vocational schools in Kyrgyzstan provide an education well enough to meet the labor markets' demands or a reform required to their curriculum to use existing resources more efficiently. The data, collected from 500 businesses, was analyzed using the SPSS package program, descriptive statistics, factor analysis, correlation distributions, correlation analysis, and reliability analysis. The survey results showed that the business community does not need university-educated professionals in law, economics, banking, and education. The graduates of vocational junior colleges with practical skills and competencies, however, are on demand. The findings of this study reveal that the most needed professionals are accountants, finance specialists, and managers in Kyrgyzstan labor market.

Keywords: Factor analysis, Kyrgyzstan, labor market, vocational school

JEL Classification: E20, C81

Introduction

Human capital is the main factor of production that provides fuel for economic growth for all countries. Some economists, however, argue that economic growth is the result of technological developments. The Solow model argues that only technological progress can explain persistently rising living standards. Gurak (2015) argues that technological progress is the product of 'creative' mental labor. As the 'quality of labor' (human capital) improves, the potential for a technological innovation increases the support of proper cultural, institutional, and technological infrastructure. Similarly, Drucker (1998) and Icli (2001) believe that the labor market should be provided with appropriate training to produce technological innovations. In the global work environment, the importance of trained and equipped employees to meet the technological age needs increases day by day.

In Kyrgyzstan, as in the rest of the world, the importance of vocational and technical education has come to prominence as a method of increasing the knowledge, skills, and competencies of individuals and enabling them to take an active role in the labor market. There is an increasing need for a labor force that can make a difference and contributes to the process of innovation. Due to Kyrgyzstan's young population, the role of education in human capital and the potential of qualified labor are very high. In 2016, there were 3,585,721 residents of working age and 2,007,897 residents under the age of 16, and 425,862 elderly residents in Kyrgyzstan (Kyrgyzstan National Statistics Committee, 2018). The population of Kyrgyzstan will double in 45 years. The young population in Kyrgyzstan is a scarce resource. The allocation of labor resources to the needed areas most efficiently is an indispensable priority for labor-oriented economic development. Vocational and technical educations must be structured regarding to the needs and expectations of local, national, and international labor markets.

About half of Kyrgyzstan's young population migrates to work and reside abroad, particularly in Russia (Kyrgyzstan National Statistics Committee, 2018). This migration will inevitably continue unless new employment opportunities are created within the country. It is necessary to implement policies to ensure that qualified labor is educated and trained in Kyrgyzstan and remains gainfully employed.

Literature Review

Technical and Vocational Education (TVE) is a type of education proven to have certain impacts on productivity and economic development in many developing and developed countries. Some authors claim that no country can develop without having quality technical and vocational education systems. For example, Jain (1992) states that a skilled workforce can be considered a "sine qua non" of industrialization. On the other hand, Chen (2009) found that vocational education schools' attendance significantly decreased academic achievement as measured by Indonesia's national test score. According to Chen's study, vocational schools do not add much value to cognitive skills measured by test scores. Also, vocational secondary school attendance results in neither a market advantage nor a disadvantage in employment opportunities or earnings premium.

Nevertheless, many developing countries have historical reasons that hinder the development of TVE; for example, inadequate equipment and facilities, less competent teachers, and insufficient fund allocation (Usman et al. 2013). Thus, Usman et al. (2013) suggest that the government should help solve TVE programs' problems by assigning technical and vocational experts to design and evaluate the curriculum, add welfare and incentives for technical teachers, and create an entire ministry devoted to technical and vocational education. Amedorme and Fiagbe (2013) stress the importance of technical and vocational education and training for all countries, and they report the problems of technical and vocational education in Ghana, such as a limited number of technical institutes, lack of facilities and materials for training students, and inadequate technical teachers. Such problems cause negative public attitudes and perceptions of technical and vocational education. Gelisli et al. (2016) discuss vocational education systems' issues globally, especially in Turkey and Kazakhstan. They emphasize that when governments implement policies with possible negative impacts, these will reduce student interest in vocational secondary schools and lead successful students to other high schools. These schools do not keep up with technological trends and use outdated materials or/and equipment to educate students.

Recent growth theories accept the role of human capital in increasing production and living standards. Unemployment is alleviated as the quality of vocational education increases. Jeerapattanatorn (2013) argues that technical and vocational education provides knowledge, skills, and competencies required in particular occupations for the labor market, reducing the unemployment for mid-level technical jobs. However, even in some developed countries, vocational education has been hampered by several factors; for instance, Canada inherited from Britain a tradition which values academic studies more than practical ones. Canada is trying to overcome this faulty education policy by allowing migrant workers to these positions (Lyons et al., 1991).

Technical education should be planned per the needs of the labor market. For this purpose, measures must be taken to improve the cooperation between technical education and the labor market. Ziderman (1997) argues that technical education should be improved according to the needs of labor markets. Communication with business owners should be improved. Private company representatives should take an active role in school management boards and curriculum development. Technical schools should have greater autonomy from the central authority.

Technical and Vocational Education in Kyrgyzstan: Current Situation and Development Trends

Kyrgyzstan is behind many countries in competitiveness, ranks 96th out of 141 countries in the Global Competitiveness Index 2019, with a score of 54. The Global Competitiveness Index 4.0 measures national competitiveness—defined as the set of institutions, policies, and factors that determine the level of productivity. Table 1 presents some selected countries' scores and rankings. According to the Global Competitive Index 4.0 2019, Kyrgyzstan's labor market is 81st among 141 countries. Kyrgyzstan has an even lower order in financial systems and market size, 112^{th,} and 125th.

Table 1: Global Competitiveness Index

Country	Score	Ranking
Kyrgyzstan	54	96
Singapore	84.8	1
USA	83.7	2
China	73.9	28
S. Korea	79.6	13
Brazil	60.9	71
Turkey	62.1	61
Malaysia	74.6	27
Kazakhstan	62.9	55
Tajikistan	52.4	104
Countries Indexed	141	

Source: Schwab, K. (2019)

Today the vocational and technical education systems in the world are moving towards a structure that is open to innovation and changes. These education systems are usually based on labor market needs and aim to improve competency for full employment. The education and training programs should consider national needs and requirements and as well as international best practices.

This study addresses the issues regarding the technical and vocational schools in Kyrgyzstan. This study investigates the existing conditions of technical and vocational schools and their contribution to Kyrgyzstan's economic development. Technical and vocational education should be developed to meet urgent labor market needs. However, some vocational junior college programs fail to meet the labor market demands and do not use existing resources efficiently.

Table 2 presents the distribution of the students in vocational junior colleges in Kyrgyzstan by fields of study. There is more demand from the students for social sciences, such as economics and management than the areas providing more technical skills, according to statistics shown in Table 2. In 2015, 467 students were enrolled to become motor technicians, and 25 students to become production machine technicians. A total of 812 students were enrolled in the construction departments, while 7,223 were enrolled in the economics and management departments. However, the computer science and engineering department students are only a quarter of the economics and business departments' enrolment.

Table 2: Distribution of Students at Vocational Schools by Occupational Areas (2015)

	Registered		Students		Graduates	
	Total	**Female Students**	**Total**	**Total**	**Female Students**	**Total**
Total	**31,622**	**16,840**	**92,550**	**52,260**	**22,971**	**13,464**
Social Services	3,075	1,026	8,245	2,844	2,568	848
Education	3,936	3,334	13,733	11,823	2,968	2,549
Health	7,041	5,558	23,436	18,934	5,340	4,461
Culture	931	597	2,370	1,559	336	235
Economics and Management	7,223	3,786	20,045	10,683	7,112	3,999
Geology	59	35	268	130	66	56
Mining	524	37	1,181	46	200	1
Energy	993	101	2,859	229	563	61
Machine Technologies	50	3	195	5	52	1
Electrical Engineering	457	44	1,075	114	134	31
Technology Equipment	945	57	2,659	146	526	54
Manufacturing Machinery	25	0	25	0	0	0
Electronic Engineering	381	44	943	141	177	48
Computer Science and Engineering	1,780	640	5,189	1,873	945	360
Service Sector	581	380	1,097	664	263	186
Engine Technologies	467	52	1,495	148	371	41
Chemical Engineering	28	4	28	4	0	0
Forestry	28	2	72	5	22	6
Food Engineering	429	205	840	428	126	76
Consumer Products Engineering	716	685	1,769	1,695	259	237
Construction	812	36	1935	125	332	33
Cartography	45	1	138	17	21	5
Agriculture and Fishing	928	159	2,434	446	435	126
Environment	126	28	431	153	111	33
Metrology and Standardization	35	24	75	44	37	16
Quantitative Professions	7	2	13	4	7	1

Source: Kyrgyzstan Statistical Institute, 2018

Technical education is necessary to meet the demand by existing establishments and create new employment opportunities to alleviate Kyrgyzstan's economic problems. An in-depth review of vocational education and vocational higher education programs is required in Kyrgyzstan.

Methodology and Data

In this study, technical and vocational junior colleges' effect on the labor market has been measured using Factor Analysis Method and their correlations. Factor Analysis is a multivariate statistical method and is used to reduce many variables into fewer factors. Factor analysis model, based on Harman (1976), can be demonstrated as:

$$Z_j = a_{j1}f_1 + a_{j2}f_2 + \ldots + a_{jm}f_m + b_j u_j \quad (j = 1, 2, \ldots, p \text{ and } m < p)$$

where j represents variables, f shows common factors, U_j demonstrates special or residual factor, b_j presents coefficient for special or residual factor, m shows the number of common factors. Classical factor analysis, for model i and individual j, can be defined as followed:

$Zji = \sum_{p=1}^{m} a_{jp}Fp_i + b_jU_{ji}$ (i = 1, 2,…, n; j= 1, 2,…, n)

where F_{pi} represents common factor value for individual i. b_jU_{ji} is the error term.

Generally, F_{pi} and Uji's average value is assumed to be zero, and the variance value is assumed to be 1. It is assumed that n residual factors are independent of each other and m common factor.

As stated before, this study aims to determine the occupational fields in the vocational and technical junior colleges demanded by the labor market and those not needed in Kyrgyzstan, given the existing economic conditions. Some vocational junior colleges graduates continue their education at the universities and complete their four-year undergraduate level education, mostly in economics, business, and law. These junior college graduates choose their fields of study without thoroughly understanding the job market and become a part of the educated unemployment. Therefore, the government must provide advice to educational institutions, policymakers, student advisors, the students, and the public regarding the gaps in the labor market and encourage students to choose the fields of study they might be gainfully employed.

A survey was conducted to collect primary data for this study since there was not enough information about vocational junior college and vocational high school graduates. Table 3 provides detailed information about the numbers of businesses in Kyrgyzstan and different regions and the sample population. According to the 2019 data of the National Statistics Committee of the Kyrgyz Republic, there are 16,591 companies in Kyrgyzstan; 92% of these (15,171 companies) are located in Bishkek, Cuy District, Jalalabad Region, Os City, and Region. Therefore, the research was conducted only in these areas. The sample size was based on the total number of companies within these areas. Based on a 5% margin of error, the total number of businesses required to represent the population is 375. However, a total of 495 surveys were conducted to increase the accuracy of the estimates. Accordingly, a stratified sampling strategy is used to represent each business area within the country.

Table 3: Total Number of Businesses and Sample Sizes for the Regions

Number of Businesses, 2015	Main Population Number				Main Population Percent				Region Percent	Sample Number			
	Total	Large	Medium	Small	Total	Large	Medium	Small	Total	Total	Large	Medium	Small
Kyrgyzstan	16591	2564	795	13232	100	15.5	4.8	79.8					
Other Regions	1420	322	113	985	100	22.7	8.0	69.4					
Main Population	15171	2242	682	12247	100	14.8	4.5	80.7	100	500	74	22	404
Bishkek City	11413	1680	436	9297	100	14.7	3.8	81.5	75.2	376	55	14	306
Cuy	1610	263	122	1225	100	16.3	7.6	76.1	10.6	53	9	4	40
Jalalabad	663	122	48	493	100	18.4	7.2	74.4	4.4	22	4	2	16
Os City	926	98	45	783	100	10.6	4.9	84.6	6.1	31	3	1	26
Os	559	79	31	449	100	14.1	5.5	80.3	3.7	18	3	1	15

Source: The National Statistics of the Kyrgyz Republic (2019)

Data Analysis

A total of 495 individuals from various businesses were included in the survey, as noted in Table 4. The research survey included 240 female (48.52%) and 255 male (51.5%) participants. The majority of the businesses, 380 in total (76,7%), have been in operation in less than 15 years and the remaining 115 businesses (23.2%) are in operation for more than 15 years. Among the companies surveyed, 221 (44.6%) employ between 1 and 15 employees, and 152 (30.7%) employ between 16 and 50 employees.

Table 4: Descriptive Statistics

		Frequency	Share (%)
Gender	Female	240	48.5
	Male	255	51.5
Number of Employees	1-15	221	44.6
	16-50	152	30.7
	51-100	47	9.5
	101-200	29	5.9
	More than 200	46	9.3
Time (years in operation)	1-5	157	31.7
	6-10	138	27.9
	11-15	85	17.2
	More than 15	115	23.2

Source: Own elaboration based on the research

Survey participants stated that they did not need about 60% of faculty graduates. The participants were asked about graduates from which professional education fields would be most beneficial to their companies. The highest observed demand was for accountants (45%), followed by managers (30%), geodesist (30%), and electronics technician (28%). The survey results also revealed that 66% of the participants did not think there was any demand for lawyers, 56% of participants for economists, and 71% for banking specialists.

Table 5: Survey Results for the Need for Faculty Graduates

Occupations	Never Needed		No Need		Moderately needed		Needed		Much Needed	
	f	%	f	%	f	%	f	%	f	%
Lawyer	198	40	127	26	78	16	56	11	36	7
Economist	172	35	106	21	85	17	74	15	58	12
Finance Expert	182	37	96	19	82	17	82	17	53	10
Banking Specialist	229	46	122	25	59	12	49	10	36	7
Manager	180	36	103	21	62	13	94	19	56	11
Accountant	118	23	77	16	81	16	122	25	97	20
Tourism Specialist	262	53	111	23	50	10	35	7	37	7
Teacher	312	63	100	20	27	6	25	5	31	6
Health Specialist	245	50	114	23	58	12	40	8	38	7
Art Specialist	274	55	116	24	45	9	33	7	27	5
Agriculture Specialist	302	61	101	21	36	7	27	5	29	6
Geodesist	180	36	103	21	62	13	94	19	56	11
Geologist	318	64	93	19	32	6	33	7	19	4
Electronics Technician	230	47	72	15	53	10	88	18	52	10
Mechanic	271	55	94	19	41	8	55	11	34	7
Aircraft Specialist	333	67	91	18	24	5	27	6	20	4
Transportation Specialist	232	47	89	18	59	12	66	13	49	10
Optical Specialist	293	60	115	23	36	7	31	6	20	4
Communication Specialist	237	47	98	20	55	11	57	12	48	10
Automation Technician	235	48	101	20	66	13	51	10	42	9

Source: Own elaboration based on the research

Factor Analysis

The Factor Analysis was applied to identify the core factors affecting the technical and vocational junior college graduates' performance. The Factor Analysis is used to reduce 12 variables affecting the performance of these junior colleges into two core factors: professional skill and professional competence. A reliability test was conducted for 12 questions asked to employers related to gauge how satisfied with vocational junior college graduates' performance. The SPSS 17.0 package program was used to analyze the data.

The Cronbach's alpha coefficient of the scales for reliability analysis on the study variables was estimated to be 0.927. Since this value is between $0.80 \leq \alpha \leq 1.00$, the scale is highly reliable (Ozdamar, 2002). Test statistics for the appropriateness of factor analysis are shown in the table below. The minimum value of Kaiser-Meyer-Olkin (KMO) should be 0.7 (Buyukozturk, 2010). In this study, the KMO value has been found 0.94, and the chi-square value of the Bartlett Sphericity Test result is 2,722.181 (degree of freedom = 66, p = 0.000). Therefore, the Bartlett Test result appears to be highly significant. Thus, according to these two values' estimates, it can be said that the data set is suitable for Factor Analysis. The eigenvalue is significantly higher than 1. There are two factors with eigenvalues greater than 1 shown in Figure 1

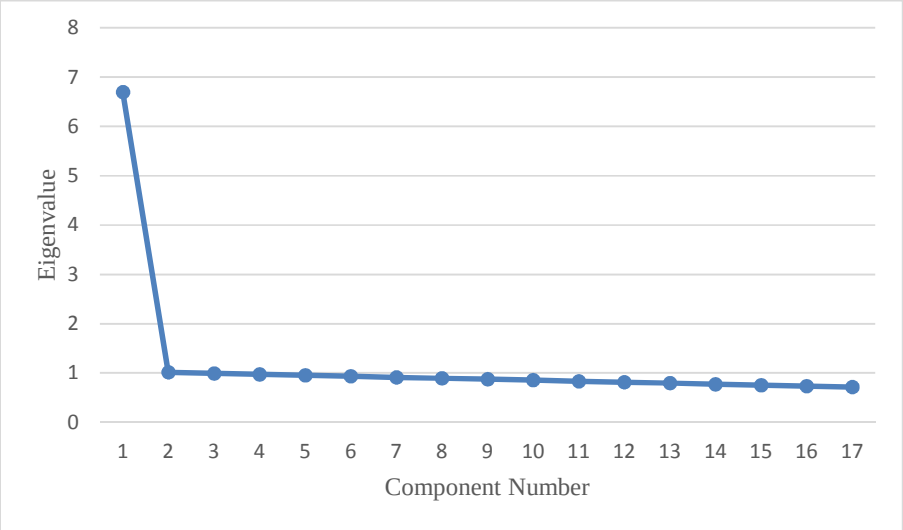


Figure 1. Scree Plot

Correlation Matrix

The correlation matrix shows the relationship between the variables involved in factor analysis. To apply factor analysis on variables, the majority of the correlation coefficients among variables should be greater than 0.3 (Hair et al., 1998). When we look at the table below, it is observed that the correlations between the variables are greater than 0.3. Consequently, factor analysis can be applied to the set of variables in the correlation matrix.

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Table 6: Correlation Matrix

	Technical and professional knowledge	Problem-solving skills	Language skills	Communication skills	Understanding professional and ethical principles	Tendency to team work	Cooperation with your business	The adequacy of the implementation of social programs training	Awareness of professional innovations	Meeting labor market demands	Recruit graduates	Labor Market-oriented Curriculum
Technical and professional knowledge	1											
Problem-solving skills	0.667	1										
Language skills	0.403	0.456	1									
Understanding professional and ethical principles	0.581	0.565	0.489	1								
Tendency to team work	0.581	0.502	0.450	0.658	1							
Cooperation with your business	0.571	0.525	0.417	0.611	0.616	1						
The adequacy of the implementation of social programs training	0.476	0.420	0.372	0.382	0.426	0.468	1					
Awareness of professional innovations	0.594	0.480	0.431	0.483	0.565	0.538	0.595	1				
Meeting labor market demands	0.579	0.529	0.488	0.568	0.596	0.526	0.477	0.662	1			
Labor Market-oriented Curriculum	0.487	0.458	0.503	0.457	0.478	0.486	0.522	0.582	0.612	1		
Technical and professional knowledge	0.478	0.471	0.417	0.453	0.464	0.479	0.511	0.534	0.509	0.646	1	
Problem-solving skills	0.447	0.443	0.457	0.467	0.459	0.479	0.533	0.576	0.572	0.657	0.685	1

Source: Authors' estimations based on the survey

As seen in the table below, the scale consists of two factors. The eigenvalue of the first factor of the scale is 6.696, and the second factor is 1.013. The first one, which is identified as important according to these values, explains 33.251% of the total variance, and the second factor explains 30.992%. The total variance explained by the two factors is 64.253%. As a result of the explanatory factor analysis performed after Varimax's vertical rotation, the first factor consists of 7 items, and the second factor consists of 5 items. The factor loadings in the first factor ranged from 0.478 to 0.809 and the second factor ranged from 0.632 to 0.821. In addition, the correlations of the items in the scale ranged between 0.372 and 0.685. According to the factors that make up the scale, the first factor is called "professional skills," and the second factor is "professional competence."

Table 7: Distribution of Scales by Factors

	Professional **Skills**	Professional **Competence**
Technical and professional knowledge	0.809	
Ability to solve problems	0.767	
Language skills	0.755	
Communication skills with people	0.727	
Understanding the professional and ethical principles	0.715	
Teamwork predisposition	0.583	
Cooperation with your business	0.478	
The qualification of the implementation training of social programs		0.821
Awareness of innovations in the profession		0.789
The sector demands		0.782
Hiring graduates		0.687
Labor Market-oriented Curriculum		0.632

Source: Own elaborations based on the conducted research.

Three hypotheses are developed related to factors: mutually gainful employment of vocational school graduates in the labor market, professional skills, and professional competence developed on the job.

As shown in the table below, since the data are not normally distributed, the Spearman correlation coefficient has been taken into account.

Table 8: Normality and Hypothesis Testing of the Model

			Sector	**Normality Test (Shapiro-Wilk)**	
H_1	**Employment of Vocational Junior College Graduates**	Correlation	0.046	Statistic	0.513
		p	0.304	p	495
		N	495	N	0,000
H_2	**Professional skills**	Correlation	0.045	Statistic	0.968
		p	0.357	p	495

		N	495	N	0.000
		Correlation	0.060	Statistic	0.970
H_3	**Professional competence**	p	0.224	p	495
		N	495	N	0.000

Source: Own elaboration based on the conducted research.

The hypotheses are

H_1: Vocational college graduates find mutually gainful employment in the labor market.

H_2: Professional skills developed on the job rather than vocational colleges.

H_3: Professional competence developed on the job rather than vocational colleges.

These hypotheses can be demonstrated as below:

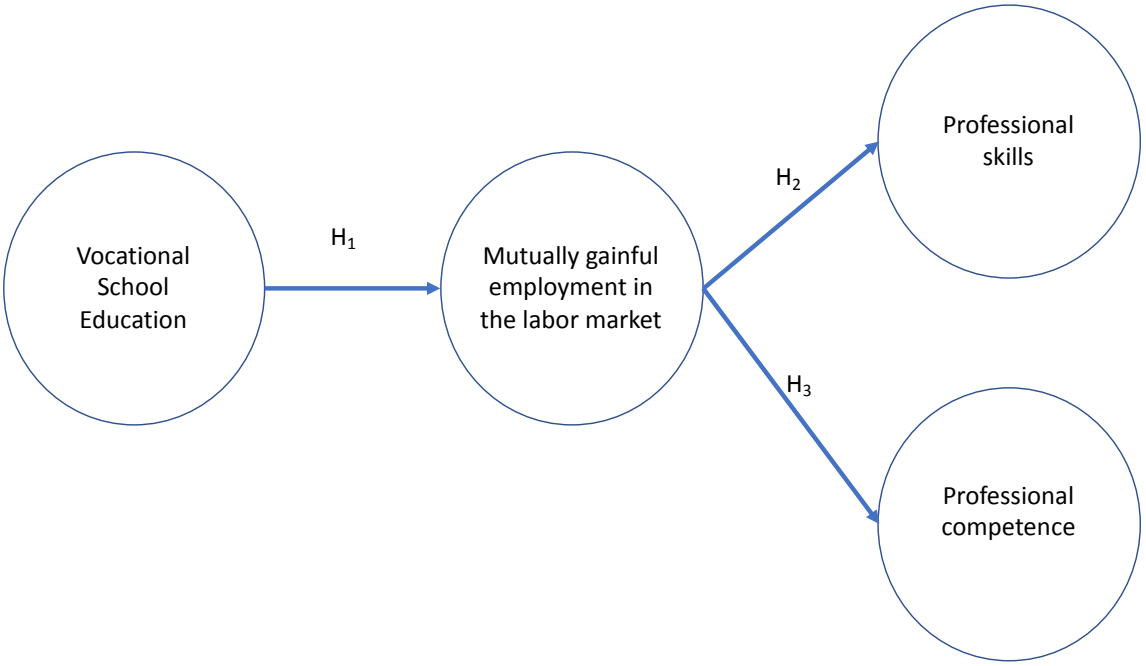


Figure 2. Hypothesis Model

According to the Spearman correlation coefficient, the probability value of H_1 hypothesis, which is related to the employment of vocational school graduates and the sector, is 0.304. The probability of the hypothesis H_2, which is related to the sector and the skill, is 0.329, and the probability for the third hypothesis (H_3) is 0.224. Therefore, all hypotheses have been accepted. So there is no relationship between variables. The two variables are entirely independent and do not affect each other.

According to the Spearman correlation coefficient, the relationship between vocational junior colleges and sectors stated in the H_1 hypothesis is 0.460 and has a P-value is 0.034. Therefore, these indicate a significant and positive relationship between sectors' growth and employing vocational school graduates. The correlation coefficient for the H_2 hypothesis, the relationship between employment in the sector and professional skills, is 0.450 and the p-value is 0.035. These results also indicate a positive and relationship between the sectors and the employees' professional skills. Our third hypothesis (H_3), the relationship between employment in the sector and professional competence is 0.60, and the p-value is 0.024, indicating a significant and positive relationship between professional competence and employment in the sector.

Conclusions

In the study, occupational training areas that are not needed in the labor market and the market demands have been determined in Kyrgyzstan's vocational schools. For this purpose, a reliability test was conducted for 12 questions related to the employment satisfaction of vocational school graduates. Cronbach's alpha coefficient of the scales used for reliability analysis was estimated to be 0,927. The test statistic for the suitability of factor analysis (KMO) is 0,940; the correlation between the variables is less than 0,3. In this regard, these two values' results are sufficient for factor analysis of the data set. A correlation matrix has been created in this respect. Factor removal is made, and the Varimax method has been used for rotation. Twelve variables have been collected in two factors. The contribution of these two factors to the variance is 64,253%. The factors are called skills and competencies.

This study shows that the existing vocational colleges do not contribute much to the Kyrgyz labor market. These results do not support the first hypotheses of a positive correlation between vocational college graduates and employment in the sector. Thus, the null hypothesis can be rejected. The result is inconsistent with the second hypothesis, which expresses a positive relationship between the sector and professional skills. In this study, three hypotheses are developed related to the employment of graduates of vocational school. In this respect, there is no significant difference between the employment of graduates of vocational schools and university graduates for the sectors. Therefore, it can be said that employees can improve their skills and competencies after employed in the sector.

In this study, the primary hypothesis is that some vocational college programs do not meet the labor markets' demands and waste resources and time. Consequently, it can be said that education should be conducted within the framework of supply and demand equilibrium, and training programs should not only take into consideration local and national needs and qualifications but also international practices. This study's empirical results support the main argument that some vocational schools' programs do not meet the demands of labor markets. They, therefore, result in a waste of valuable resources and time.

This study's main implication is that there is a mismatch between market demands and the vocational and technical education system in Kyrgyzstan, similar to many other developing

countries. Thus, the revision of the curriculum implemented in vocational schools according to labor market demand will lead to better labor market outcomes.

For future studies, scales can be further developed, and comparisons can be made on sectors and countries.

Three hypotheses related to named factors, vocational higher education and sector, have been developed. The relationships between the hypotheses were tested, and the hypotheses were found to be positive and significant. It was found that there is a significant relationship between the sector and vocational school graduates, and there is a significant and positive relationship between the sector and skills and the sector and competence. Therefore, it is seen that sectors can meet their own labor needs when they employ vocational school graduates. It was seen that they need intermediate staff in the fields of skill and competence. The most needed professionals are accountants, finance specialists, and managers. In this respect, they can contribute more to the labor market if they show more attention to Vocational School students' skills and competence areas. In future studies, scales can be further developed, and comparisons can be made on a country basis.

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