Structural and Logical Approach to the Introduction of Dual Training in Vocational and Technical Education System of the Republic of Kazakhstan

Railya Minibulatovna Mukhamadeyeva*, Takhir Minibulatovich Mukhamadeyev and Irina Aleksandrovna Mukhamadeyeva

Kokshetau Abay Myrzakhmetov University, Republic of Kazakhstan; raulia@list.ru

Abstract

The article reveals the main destructive factors of implementation and operation of the dual training in vocational education of the Republic of Kazakhstan (RK). In this regard, the study develops a conceptually new approach to the system of vocational education in Kazakhstan, based on the structural and logical approach of the introduction of dual training. Within the study there was developed the structural-functional model of the introduction of dual training in national practices of vocational and technical education, the distinctive advantages of which are: an integrated approach, consideration of the destructive factors in the development of an integrated system of vocational training, the possibility of continuous improvement and compliance with the strategic goals of the modern development of the national education system of the country. The study results allow improving the quality of labor potential, innovative orientation and competitiveness of the national education system of Kazakhstan.

Keywords: Dual Training System, Education System, Employment Potential, Structural-Functional Model, Vocational and Technical Training

1. Introduction

Socio-economic changes in the Republic of Kazakhstan, the increase in investment in the development of production and the social sphere form preconditions for the expansion of vocational and technical education and the scale of worker’s training. In recent years, Kazakhstan has experienced the growth of an aging workforce, which adversely affects the process of normalization of the labor force reproduction¹. At the same time, the quality of the workforce training in most cases does not meet modern requirements in terms of its professional and educational training, mobility and economic activity in general. As the majority of vocational and technical educational institutions do not meet the modern requirements of the employment market, hence the absence of demand among young people of technical education. It determines the low level of staffing of such institutions. Today there are 820 institutions of vocational and technical education in Kazakhstan². In 2015, the industry need for skilled labor in most regions of the Republic of Kazakhstan at the expense of these institutions is satisfied less than 40%². In this connection the innovative development of vocational and technical education in the process of training future workers based on the dual form of education is of a special urgency. The introduction of the dual system of education is a strategically important process of reforming the national education system of the Republic of Kazakhstan.
in accordance with the strategic plan of development of the Republic Kazakhstan for 2011–2020 according to which the prerequisites of modern education compliance with the industrial-innovative development of the country’s economy, the needs of the progressive business are generated. It plays a key role not only in meeting the individual needs or the labor market needs, but also the needs of the economy of Kazakhstan, promoting its competitiveness.

2. Review of the Relevant Literature

Improving the quality of educational services as a fundamental factor of formation of innovative economy and society is reflected in scientific many works. Major problems of modern education have been disclosed, trends and innovative ways of its development have been found out. Recently research directions in the field of innovative development of education, in particular the introduction of the dual system of training in the educational process have been actualized. The system of dual training as education aimed at generating practical and theoretical competence of the students has been fundamentally studied in the works by Matveyev, Orlova and Gracheva, Lindner. Peculiarities of the introduction of the dual system of training in vocational and technical education were considered in works by Lindner, Orlova and others. Particularly noteworthy are the works of scientists dealing with the benefits of vocational education system due to the introduction of dual training, integrated education as a factor of sustainable social and economic development of any state.

The scientific researches relating to the specifics of the implementation of the dual system, depending on the scope and direction of the educational activities are interesting from a practical point of view.

Meanwhile, despite its fundamental character the paradigm of the dual education system lacks a developed theoretical issue about the peculiarities of the implementation of the dual system of training in the national vocational training practices. In connection with it the purpose of the study is the identification of destructive factors and features of dual training in vocational educational process in the RK, the development of a conceptual model of effective implementation and operation of an integrated practice-oriented training to improve the quality of the labor potential of the country.

3. Method

In a study structural and functional modeling under the IDEFO technology was used to develop the contextual model of the introduction of the dual training of learning to the education system of Kazakhstan. Structural and functional modeling is based on the graphic language to describe the sequence of actions.

In accordance with the IDEFO methodology the modeled system is represented in the form of blocks—a set of sequential processes occurring in the system under study, and the relationships between them. The system interactions with the external environment are described by inputs that are shown on the left of the block, outputs—on the right hand, the control—at the top and the mechanism—at the bottom. Incoming flows reflect the resources that are used by the system to perform its functions. The output is a result of the system functioning, the control implies policies and procedures governing the operation of the system; the mechanism includes the resources needed to perform the system functions. In the course of control the system converts the inputs into outputs using certain mechanisms.

The practical implementation of the structural and functional modeling under the IDEFO technology is carried out using BPwin computer modeling.

4. Results

New political course of the Strategic Plan for development of the Republic Kazakhstan for 2011–2020 and “Kazakhstan-2050” is aimed at strengthening the intellectualization of human capital by providing access to education and improving its quality. In modern conditions, one of the global solutions of the system to improve the quality and competitiveness of human resources in the Republic of Kazakhstan is to maximize the practical implementation of a dual mechanism of learning in the national education system. This approach has been widely used in educational practice in Germany and is characterized by a high level of productivity. In the country 500 thousand enterprises out of 3.6 million are involved in the professional training program. More than half are representatives of small and medium-sized businesses. That is a private business has invested considerable funds in training experts of the desired profile.
The dual education involves a combination of theoretical and practice-oriented students’ training; i.e. students learn the theoretical basis of technical and vocational training only 30% of the total training time, while 70-80% of the time the student is directly involved in the process of acquiring the production cycle of the enterprise\textsuperscript{13}. A business entity directly participates in teaching students by providing appropriate conditions for the formation of practical competencies in production, accepts related costs, including the potentially possible cash award to students.

It should be noted that the level of employment of graduates of vocational education institutions in the traditional education system in Kazakhstan ranges from 44.9% to 81%. Suffice high rate of employment (more than 75%) is observed in Karaganda, Aktyubinsk, South Kazakhstan, North Kazakhstan, Pavlodar regions and Astana (Figure 1). But more than 80% of them are employed under the government contract. In general, Kazakhstan with the traditional system of education is characterized by the low level of employed graduates – 68.9%, of which 74.8% are employed under government contracts. This is despite the economic demand in workers in the country which is satisfied by no more than 40%. While international experience shows, employment of college graduates working within the dual education system is over 94%\textsuperscript{14}.

The introduction of the dual system into educational practice of the Republic of Kazakhstan in modern conditions is carried out in accordance with the roadmap for the implementation of dual training of the National Chamber of Entrepreneurs in cooperation with the Ministry of Education and Science\textsuperscript{19}. Under this program, more than 170 colleges will train more than 10,000 specialists in 83 professions for 400 companies in the country during 2014-2016\textsuperscript{19}.

At the beginning of 2015 in Kazakhstan 280 colleges were implementing educational practice in cooperation with the enterprises. This indicator is progressing, as early as the previous year only 176 colleges were involved in the dual system. At the regional level Pavlodar region takes the leading position – 88% in the Republic of Kazakhstan\textsuperscript{2}. Solving the problem of vocational education has become a state objective. The “Technical and Vocational Education Modernization” project has started in the country. For its implementation within the state program for education development realization USD 33.2 million, including USD 29.23 million of a World Bank loan and 4 million from the republican budget is provided for 2011-2020\textsuperscript{20}.

At present, the preconditions are formed for successful implementation of the dual approach into the national education system. The most important of them must be focused on the following areas:

- schools and colleges facilities and resources modernization. For the last 3 years more than 14 blntenge, including 1.8 billion for the facilities and resources modernization, have been allocated\textsuperscript{21};
- the use of innovative technologies for the training of competitive specialists. The introduction of the “Bshgmal” automated management system allows bringing information and education services to each participant of the educational process. In addition, 25% of the public educational institutions of technical and vocational education use the training technology developed by the German firm LUCAS NÜLLE\textsuperscript{22}.

Figure 1. Regional Structure of the Employment Level of Graduates of Vocational Education Institutions in the Republic of Kazakhstan at the beginning of 2015. (Compiled by the author according to\textsuperscript{2}).

Figure 2. The Indicators of Financing the Dual Education in Kazakhstan by Business Structures, thous. Tenge. (Compiled by the author according to\textsuperscript{2}).
As a result, dual education funding in Kazakhstan demonstrates the growth of business investment in scholarship payment, facilities and resources strengthening of technical and vocational institutions. Thus, in 2014 the Kazakh enterprises’ scholarship fund increased by 37.8% compared to 2013, while the financing renovation of educational institutions facilities and resources – by 38.2% (Figure 2). At the same time the salary payments for the teaching staff of technical and vocational educational institutions decreased almost by 82%.

Specialized institutions underfunding and low wage of the staff gives rise to one of the fundamental problems of the effective implementation of the dual system in Kazakhstan – the lack of qualified teaching staff. Provision of teachers with academic and scientific degrees in the colleges of the Republic of Kazakhstan does not exceed 6.4%\(^2\). In addition, the actual problem is the availability of qualified engineering teaching staff, the need for which, in general, in the system of vocational institutions in Kazakhstan was 474 persons at the beginning of 2015 (Figure 3).

Along with a low level of highly-qualified staff provision a decreasing total number of students covered by the vocational education system should be considered a destructive factor for the effective implementation of the dual system in Kazakhstan. The decrease in 2012-2014 was about 10% (Figure 4) and is at a relatively low level - 16.6%. For example, this figure in the EU countries is 47.9% and in the Organization for Economic Cooperation and Development (OECD) – 50.3%\(^{15}\).

Alongside with the reduction of students’ number in vocational educational institutions in the Republic of Kazakhstan and the process of the requirements strengthening for the quality of educational services in the country, there has been a sharp reduction in the number of vocational educational institutions.

Only in the last three years their number has decreased by 8%. Also the decline in the public vocational services was 7%, while in the specialized private institutions – more than 10% (Figure 5).

The low level of facilities and resources in the vocational educational institutions should also be noted as a limiting factor of dual education in the country. Thus, the state colleges’ special equipment for today is only 72%, 1 computer for 11 people, only at average 69.6% of the institutions have internet access\(^2\). Lack of computerized classes limits the possibility of the specialized software introduction, for example, KOMPAS-3D LT. These programs are ideally adapted for educational work in the development of various fields of activity, and contribute to the practical skills development\(^{23}\).

Thus, on the basis of the above, we can conclude that the current state of the national education system is characterized by a system of organizational destructive factors hindering the effective dual system implementation in the education of Kazakhstan.

Considering this, at the background of the budget financing reduction of vocational education (from 0.3%
of GDP in 2013 to 0.2% in 2014), a forecast decline in the birth rate in Kazakhstan until 2021, an urgent need is determined to develop a measure set to streamline the implementation and effectiveness of the dual system education in the practice of Kazakhstan.

In this study, the structural and logical model of the effective implementation of the dual training system in the educational process of the Republic of Kazakhstan is proposed (Figure 6).

This context diagram is a set of interrelated processes, the functional basis of which is the generation of conditions for increasing the employment potential of the country on the basis of the dual education practice.

5. Discussion

Within the structural-logical framework of the effective implementation of the dual system of education the development programs for the popularization of blue-collar occupations at the national level is offered. In this aspect, the active advertising on the benefits of vocational education on media seems appropriate. The organization of the effective profession-orientated work at the enterprises in order to familiarize high school students with the best practices of labor occupations, providing students with the opportunity to learn directly the peculiarities of the future blue-collar occupations and the activation of popularization of working professions in Kazakhstan will contribute to the implementation of various national and international competitions, championships and festivals of professional skills. The result of the working professions popularization phase should increase their prestige among young people, which in turn will drive up the demand for technical and vocational education in Kazakhstan.

The next stage of the introduction of the dual education should become the improving of workforce capacity. The initial event in the framework of this stage is further training of the existing teaching staff of vocational education institutions in Kazakhstan and the introduction of innovative training programs and teachers’ certification of special technical subjects and masters of vocational training, depending on their skill level and sectoral features.
Another important factor in the framework of improving the quality of workforce capacity is raising the salary level of the institutions employees. Since the college teachers’ salary is by 1.4 times less than the Republican average monthly salary, then bringing it to the average in the industry will help attract highly qualified personnel in the field of vocational education, and the introduction of the differentiated pay system model will determine the motivation of continuous skills improvement and staff certification training.

The next step is represented by the educational clusters formation within the dual training. As a flexible network structure the interconnected objects must be:
- school;
- vocational educational institution;
- business structure.

The education cluster involves the interaction route development within the education cluster. That is the route development of mutually beneficial relationships between the individual elements of the cluster as part of the partnership formation. The basis for the cluster formation is pupils’ awareness and campaigning to fulfill the students’ admission to vocational educational institutions. The innovative solution in this cluster operation is a relationship based on an employment contract between colleges and enterprises of various branches on the regular students’ practical training in the company on mutually beneficial terms.

As part of the educational dual system development in Kazakhstan, it is advisable to form the following industry clusters in such base colleges as:
- Mangistau Polytechnic College, Aktobe Polytechnic College, West-Kazakhstan Industrial College in partnership with oil and gas, petrochemical industries in the western region of Kazakhstan;
- Kostanai Polytechnic College and Higher Technical School in Kokshetau on the basis of the agricultural and construction companies in the Northern region of Kazakhstan;
- Temirtau polytechnic college on the basis of the mining and metallurgical industries of the Central-Eastern region of Kazakhstan;
- Almaty State College of power and electronic technology on the basis of building industry, engineering, electricity and information communications enterprises in the Southeast region of the country;
- College of New Technologies in the city of Shymkent, Zhambyl Polytechnic College and Kyzylorda Agro-technical College on the basis of the enterprises of agriculture, light and food industries, construction and petrochemical industry of the south Kazakhstan region.

The creation of educational cluster allows combining business projects in a particular area of the dual training, fundamental research and advanced design systems of new technologies, techniques, intellectual products and manufacture of these products in one (territorial, functional) area. For the employer-customer of educational services the education cluster is a factory of the complex practice-oriented knowledge that allows determining the areas of priority investments.

The final stage of the introduction of adaptive model of dual training is to increase the budget financing of vocational educational institutions of Kazakhstan with a view to updating their material and technical base. This area involves the complete computerization of classes, the introduction of the newest specialized software, acquisition and adaptation of the educational process in advanced prototyping technologies, etc. This approach will stipulate improving the quality of educational services and the increasing the index of creation of social conditions for students.

Structural-logical model of the introduction of dual training in educational practice is the foundation for creating conditions to improve the quality of labor potential in Kazakhstan. It is based on the application of best global practices of partner countries in providing technical and vocational education and has a number of benefits of social and economic development of Kazakhstan:
- It utilizes the main drawback of the traditional vocational training – the gap between theory and practice;
- It redounds to increase the quality of professional competence of students through as close as possible training to the specific needs of employers.
- It significantly reduces the period of professional and psychological adaptation of students in terms of production
- It forms motivation to generate knowledge and practical skills in the work because the qualitative characteristics of their knowledge, are, first of all, conditioned by the performance of official duties in the workplace;
- It takes into account the requirements presented for the professional potential of the future experts in the course of training;
• It determines the conditions of the mutual interest of employers and candidates in the formation of co-existing competencies in order to achieve maximum results;
• It helps the employer predefine the future employee;
• It provides much higher level of demand for graduates and their employment than previously;
• There are new approaches to vocational guidance of students and management of their careers in the development of partnerships between education and partner companies.

6. Conclusion

Thus, in the framework of the study the structural-functional model of the introduction of the dual system in vocational and technical educational practice of Kazakhstan was developed taking into account the benefits of the dual training system. This adaptive model is an innovative approach in the educational process, as it implies a clear co-ordination of successive steps for introduction of dual training. Improving the quality of vocational education on the basis of increasing demand for professional training, improving human resource capacity, establishing of mutually beneficial partnerships between business and education, updating the material and technical base and the quality of education should become their productive efficiency in vocational services sector. The advantage of the conceptual model is an integrated approach to the field of integrated education, which is based on the measures to eliminate destructive factors of its development in the field of vocational education; it has the opportunity of continuous improvement and meets the strategic objectives of the development of the modern national education system of Kazakhstan. The practical implementation of the presented structural and logical model of dual training system introduction will be the basis for improving the quality of specialists’ training for the production needs of the country.

7. References

11. Kalinin AS. Training of personnel relevant to the requirements of high-tech industries based on the dual education in the Volgograd region. Proceedings of the VIII International Congress and Exhibition Global Education; Moscow. 2014; 421 [in Russian].