

Adaptation of the “7 Rights” Model to Education of Logistics Engineers

“Tell me and I will forget; Show me and I may remember; Involve me and I will understand.”

(Confucius)

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The article presents the authors’ original concept concerning the “7R” model in education of engineers of logistics at the higher education level with practical profile. The concept is based on classic optimizing solutions used in logistics processes. The paper tries to reorganize the education system of logisticians and adjust it to the needs of the labour market by applying innovative solutions, which activate all the system’s stakeholders at the same time and level.

Keywords: "7R" model in education, education of engineers of logistics.

1. INTRODUCTION

The way in which the approach to market competition has recently changed from the concept of competing individual companies “4 P”¹ to the concept of competing logistics supply chains “7R”² has forced a holistic outlook and interpretation of modern logistics tasks.

Therefore, due to this new approach, it is vital that those directly involved in modern logistics are well prepared and educated according to the new standards.

The main issue facing the educational system in the field of logistics is therefore to ensure that the students quickly and easily adapt and are able to start work in accordance with the new expected standards. This issue has been addressed by the authors of this paper as they propose the comprehensive and holistic approach to the education of new engineers of logistics in higher education.

The concept of the new model of educating logisticians is connected with the “7R” principle, which is omnipresent in logistics. In the case of the

idea “affecting” the field of logisticians’ education we are dealing with:

- the right didactic “product” understood as educational program determined by the education profile;
- the right customer for the product which becomes a student acquired due to the proper recruitment process;
- the right place which is the proper didactic base;
- the right time related to the length of blocks and matched didactic modules;
- the right quantity of specializations and courses resulting from the labour market needs;
- the right quality which is recognisability of diploma in the employers’ community;
- the right costs which should be reduced as much as possible on the client’s side without forgetting that they are derived from the assumed client’s service level - that is the quality of education process in our case.

Such interpretation of the “7R” logistics principle in relation to the education of logistics engineers allows stating the working hypothesis which claims that an efficient and effective education of logistics engineers at higher education level according to the expectations of the labour market is possible through the synergy of defined “7W” factors (fig. 1).

¹ The “4P” marketing concept includes: product, price policy, promotion policy and distribution policy – author’s note.

² The “7R” principle in logistics is to provide the right product to the right customer at the right place and time, at the right quantity and quality for the right cost – author’s note.

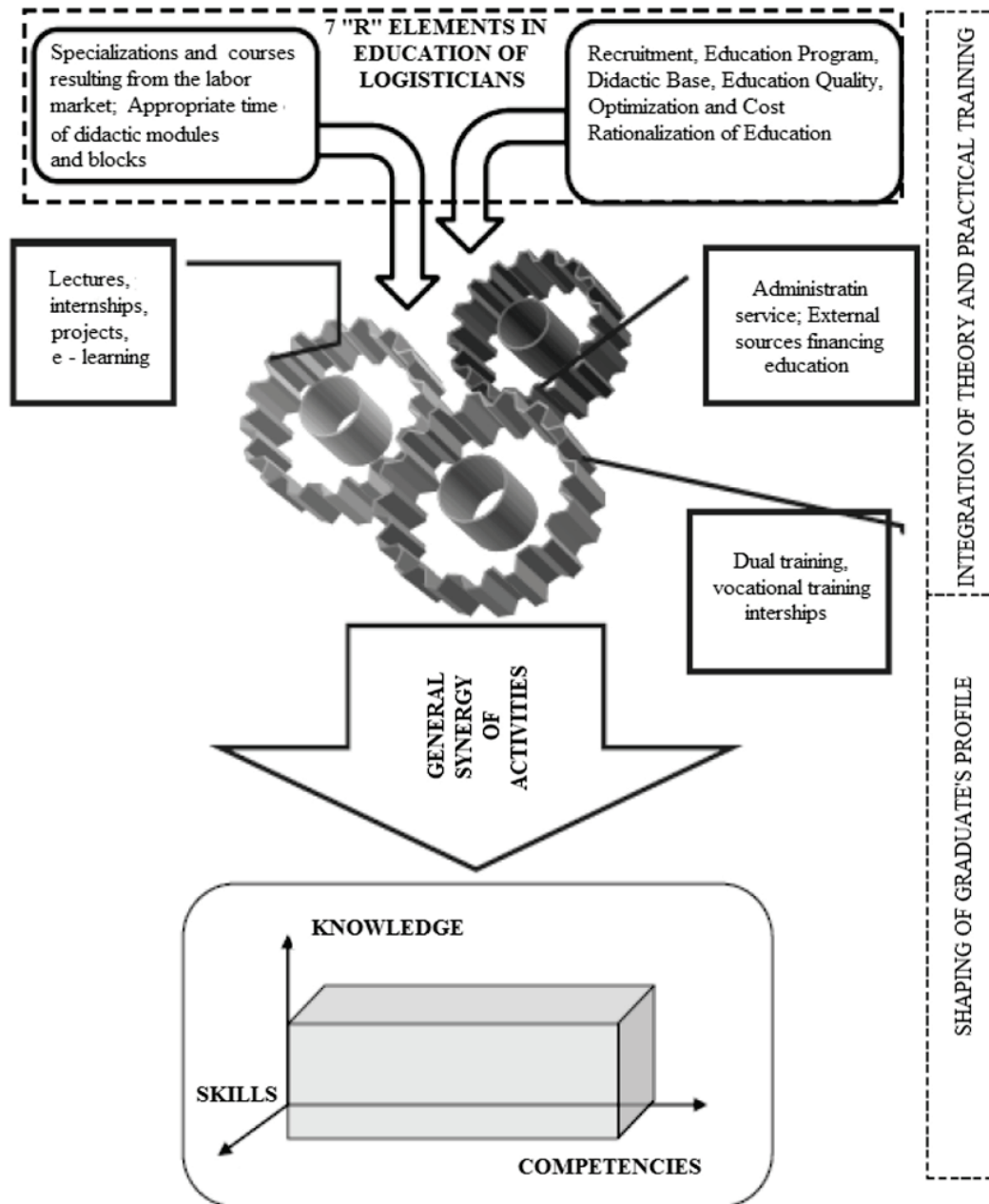


Fig. 1. The application of the “7R” principle in logisticians’ education.
Source: authors’ own.

To narrow the research problem down to education of logisticians at higher education level in professional engineering is the main limitation in these considerations.

The main aim of the proposed model is not only to ensure a high quality of education, but also to ensure a certain cooperation (or symbiosis) between the numbers of graduates and the available vacancies in the market.

The completed research tasks proving the stated working hypothesis and solutions to the research problem raised were as follows:

- identification of stakeholders of the proposed education model;
- analysis of projects within identified functional areas of education of logistics engineers which is so-called educational principle of the “7R” in logistics;
- identification of required support from the higher education institution and appointed stakeholders;
- synthesis of desired educational activities in a consistent model of education.

2. STAKEHOLDERS

The stakeholders within presented concept will be:

- students understood as direct recipients and users of the model. They will use the results of the model developed in the educational process;
- teaching staff which may also be included in the model users’ group within the didactic process as well as the management responsible for the overall supervision, coordination and monitoring of projects related to the implementation of the particular project e.g. departments’ management, Dean’s division;
- the university which serves as a sponsor providing financial resources in the form of money or non-financial support for completion of the model as well as administrative divisions for the student’s service;
- employers understood as not only entities which use the new model for the employment of logistics graduates but also as entities of the educational process within the accepted solutions of dual training.

The employers may therefore serve in this type of model as not only users but also as sponsors who offer possibilities of dual training, internships and student practices within the partnership with the university. It is of course a kind of strategic alliance between these two entities since is the employer who will benefit from the results of the developed model and the university will observe a demand of the labour market for its graduates.

The equilateral triangle represents a kind of synergy of objectives which must take place between focusing on the student, teaching staff (the employees of the business partners and therefore future employers may also be included here) and both administrative and organizational support from the university (figure 2).

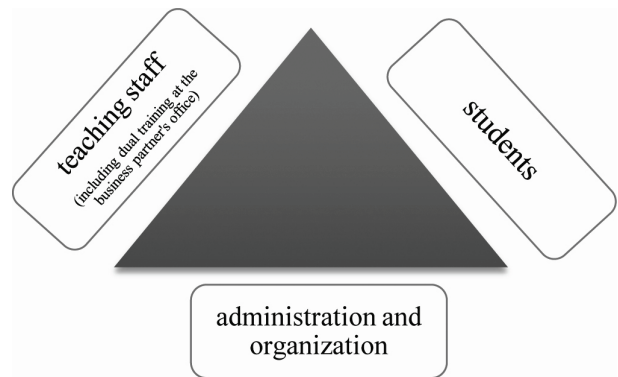


Fig. 2. The model of synergy of stakeholder’s objectives under the concept of the “7R” in logisticians’ education.

Source: authors’ own.

There is, therefore, a feedback between “inputs” and “results” of the undertaken activities within one sphere to all other. It means negative effects are to be expected e.g. decline of the administrative and organizational support level affecting both teaching staff and student’s satisfaction. The successful implementation of the “7R” model in training logistics engineers requires all listed entities to be the project stakeholders at all levels of the project’s implementation.

3. EDUCATION PROFILE

The knowledge required for the efficient use of logistics is very broad and diverse, depending on what kind of the economic (industrial, commercial, public services) or public activity (army or healthcare) we will have to deal with. In this context, the basic areas of logistics knowledge must be supplemented with supporting scientific disciplines (fig. 3).

Two trends can be observed in Polish education system in the field of logistics [Kisperska - Moroń, www.logistyka.net.pl, p. 345]:

- the logistics staff education system at technical universities, mainly in the fields of studies like: transport, management and organization of production, computer science;
- the education system in the field of logistics for business use at the economic universities and the economic departments of the universities.

In this case the education is based on the natural division of knowledge into the engineering part and the part relating to business. The logistics engineering staff whose major domain should be logistics production (system designers, operational managers), transport and warehouse management

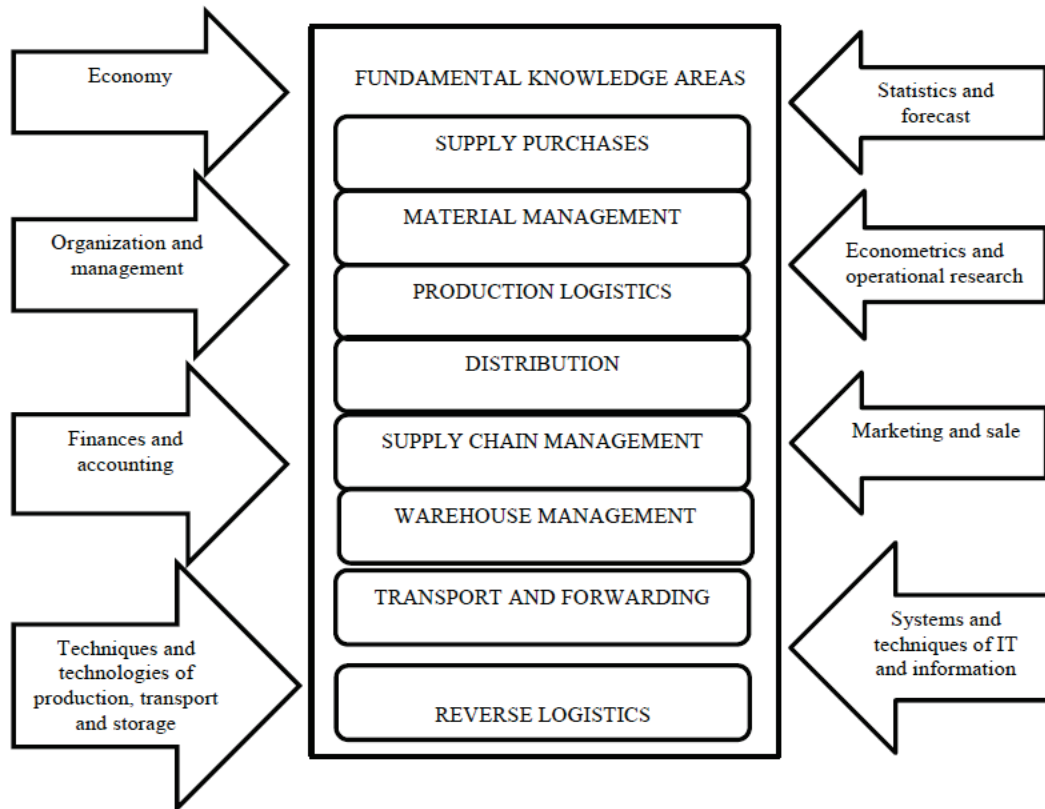


Fig. 3. The scope of the required academic knowledge necessary for effective logistics management.
 Source: authors' own on the basis of M. Fretsch (edit.), *Podstawy logistyki*, [English: *Basics of logistics*] Logistics Library, Poznań 2006.

system is prepared for profession at technical universities. At the economic universities we are essentially dealing with education in the areas of *business logistics*. It sometimes translates into an uneven spread of emphases promoting so-called “soft competencies” and failing to appreciate the necessity of logistics “hard skills” for planning and logistical thinking.

There are certain foundations which ought to be remembered when it comes to the engineering specializations. Each modern engineer cannot do without the following:

- solid education in basic and technical science;
- good use of drawing skills as primary form of communication for the engineers;
- abilities to design in the given field of knowledge (designing is the fundamental form of the engineer's work);
- solid knowledge in the field of material engineering;
- ability to take measurements of the main physical and geometric values (including electrical measurements);
- necessary skills of using tools and instruments;

- ability to use modern means of information processing and computer tools in respect to graphic engineering;
- knowledge enabling the assessment of social, ethical and psychological effects of engineering [Brzezinski, 2012, p. 75].

There is a need of detailed knowledge depending on the specialization in addition to the general engineering knowledge and, among others, it should include:

- knowledge of the modern logistics systems relevant to the specialization;
- production and services management;
- issues regarding to processes designing and logistics systems in the relevant specialization;
- specialist knowledge module regarding the basics of logistics as well as elements of logistics stages within a company and in the supply chain;
- issues regarding to the logistics infrastructure, standardization and quality, transport economics;
- issues regarding to the automation, robotics, electrical engineering and electronics.

Practical forms of education covering approximately 50 % of the classes should include exercises and lab classes not only at the universities but at the chosen employers also. These classes should primarily teach logistics thinking. Thus, design and purposeful assignments should be an important part. They would test the skills of using methods, techniques and tools of logistics management at the operational level first and then at the higher level depending on the type of studies.

The employers involved in the process of creating and modifying the curriculum can ensure practical dimension of studies. The collegiate and advisory body³ would be a perfect tool within which the employers and representatives of the logistics department management review the study structures, syllabuses and matrix of learning outcomes. This approach enables verification of the curriculum prepared so far at the didactic level only.

The student practices are the second element which needs to be noted. Their efficiency can be shaped by activating employers and teaching staff oriented on the preparation of the index of student practices. The student practices supervisor/department representative in agreement with a particular employer would prepare the index. However, the completion of the student practices could be in the form of an examination before the Joint Committee, comprising the student practices supervisor and an appropriate employer's representative.

4. STUDENT – IS HE/SHE REALLY ONLY A “CLIENT” ON THE DIDACTIC SERVICE MARKET?

The science in itself is not an easy project, therefore approaching it as a product that can be bought preferably with very little effort due to large availability caused by the mass education at the higher level may result in “trashy value” of a diploma. In a short period of time, graduates of such universities would be ignored by any potential employers. Such “stressless education” may completely distort the purpose and character of education because everything will boil down to the “purchase of diploma” at the lowest student's cost in non-financial meaning as well as to

³ The Entrepreneurship Council which brings together representatives of significant entities from the logistics industry in the particular region can be an example of such body - author's note.

deterioration of the university's ranking. On the other hand the coming demographic decline and human tendency to avoid difficulties may cause such tendencies. Of course, such threats are always present at private universities without public grants and subsidies.

Considering full-time and part-time studies as well as in accordance with the “4C”⁴ principle the following questions should be defined. How can the expectations be met? How can the student's needs and expectations be shaped? What will be the best way of communication with the student as well as what should be done to ensure the comfort of studying? It should be noted that great majority of students at private universities are part-time students mostly working and completing their education⁵.

5. THE RIGHT PLACE – THE APPROPRIATE DIDACTIC BASE

The appropriate didactic base and library resources adequate to the needs as well as ensuring an access to the appropriate laboratories providing not only computer software for logistics systems but also enabling an understanding of some problems of at least cargo management and science of commodities in a more realistic way play an important role in education of the future logistics engineers. Implementing dual training can be an important factor. It consists in the appropriate balance of emphases in practical and theoretical education between *strictly* university teaching staff and coaches selected as well as declared by the employer. Of course, due to the companies' business objectives such “*non-profit*” activity is not possible in the mass extent. Thus, skilful fundraising for this purpose becomes so important. Implementing dual training should achieve a certain minimal standard due to the

⁴ The marketing mix of the “4C”:

- Customer value – shaping and satisfying the client's needs in relation to the increase in value;
- Costs – costs reduction on the client's side;
- Comfortability (convenience) – the client's comfort;
- Communication – the appropriate level of sharing information between the client and the supplier – author's note.

⁵ The Pareto principle can be applied here: Full-time students are 20%, part-time students are 80% – author's note.

employers’ potential costs and organizational constraints⁶. It should include the following:

- periodic evaluation of the study structures and curriculum of specializations by the business partners;
- identification of courses and included curriculum which can be implemented within dual training;
- identification of the employers and university’s possibilities in respect to selecting resources for their implementation (in terms of lecturers and instructors as well as rooms);
- schedule development of study visits at the employer’s office within which a defined number of courses would be accomplished;
- identification of the company’s real problems to be solved, and then setting up task forces among students which would present solutions in a specified period of time;
- schedule and scope development of the student practices in consultation with the employers (everyone, who is obligated to do a 12 week student practice would have to complete it on a continuous basis as well as settle it based on the assignments specified in the index of student practices or a possible exam);
- ensuring suitable numbers of places for the interns by the employers;
- developing a special short-term internships (3-month periods) for outstanding students after the graduation;
- developing a database of diploma theses based on the proposals from the business partners.

6. THEMATIC MODULES AND THEIR TIME FRAME OF IMPLEMENTATION

Daily didactic blocks for both full-time and part-time studies should not exceed 8 – 9 hours due to the specific nature of engineering studies and to avoid “fatigue” of both sides. The size of groups at the engineering seminars is an important issue. They should not have more than 12 people from the perspective of didactic process and its effectiveness.

The matter of workshops is another issue. The decision making games are becoming more popular form of workshops and they are no longer

implemented within one course but during the overall specialization of the engineering studies in the last year of education (the seventh semester is preferred). They became a summary of the acquired spectrum of theoretical and practical knowledge. The decision making games for logistics engineers within the scope of the management knowledge should take place according to the separate scenario. They should be implemented by an independent team (e.g. coaches from the consulting, training and advisory companies), should have a specific character of an “audit” and assessment of the degree of the program implementation (according to the agreed matrix of results, in accordance with the standards of the National Qualifications Framework).

The decision making game should be implemented during a three-day block of courses where the first two days would be dedicated to the exercise scenario introduction and its implementation. The third day, however, would be dedicated to the presentation and comparison of proposed solutions as well as the assessment of their effectiveness by the coaches and the exercise groups. The “soft” competences, the managing, the group leading and etc. should also be evaluated. The participants who passed the evaluation process should receive a certificate of completion.

7. THE OFFER OF SPECIALIZATIONS

The offer of specializations at the educational market, which is dynamically changing, should result from the labour market needs. In the light of the above, the modern university educating students in logistics engineering should maintain extensive contacts with:

- leading research and deployment centres of logistics systems where information about trends and directions of engineering rooted in the realities of logistics processes can be obtained;
- employers of the TFL industry where trends of the employment level can be identified on regular basis as well as a database of internships and professional practices can be developed;
- production companies where logistical support for the production and exploitation fulfils a specific role in maintaining continuity and the company’s operation rhythm; it is based on production and design engineering;
- representatives of state and local administration in order to gain knowledge on

⁶ The employer’s sensitive data protection is the most important problem – the potential partner in dual training – author’s note.

development trends in the region, implemented investments in logistics and production infrastructure;

- the Labour Office representatives in order to obtain information on the professions wanted by the labour market, vacancies, fluctuation of logistics personnel at least in the perspective of the regional analysis (which may be the base for the academic Career Office).

The implementation of studies on the business partners' demand becomes an emerging trend on the educational market. It makes sense to offer such studies if the employer declares to employ a specific number of graduates which is a rather uncommon practice. To take patronage over particular specialization by a business partner will certainly be a more reliable solution. Such solution is more effective in the case of the labour market because it allows students to have a wide access to professional practices within the activity area of the partner or coach of the specialization as well as courses partially taught by experts delegated by the partner.

The most important skills of logistics specialists in respect to the general employers' expectations include:

- creative and analytical thinking skills;
- communication skills, negotiating skills and ability to work in a team;
- ability to use calculation techniques;
- planning skills, ability to use time effectively and decision making skills;
- knowledge of foreign languages and cultural diversity, knowledge of the Polish and European economic law;
- ability to use the IT systems applied in logistics;
- continuous improvement ability;
- risk assessment and risk prevention ability [Brzeziński, 2012, p.75].

8. THE QUALITY AND THE COSTS OF EDUCATION

The issue of logistics education costs is especially important in the time of crisis and decreasing number of students caused by unfavourable demographic trends. The main question remains whether the profit of private university can be achieved by:

- offering a didactic and affordable product (logistics engineering studies) at the small university's "profit margin" which affects the

high "turnover" and is represented by a large number of candidates for selected field of study; it results from the high recognition of diploma on the labour market and competitive prices, or;

- offering a didactic product at the best price (the cheapest); it is achieved at the high reduction of didactic costs as well as the reduction of student's administrative and organizational support.

The second solution always ends with quality dumping and does not bode well for the growth of the university in the long run in accordance with the equilateral triangle model of synergy of stakeholder's objectives for the education system.

The optimization of solutions within the costs must go hand in hand with the proactive solutions on the ensuring quality side. There is no high quality at a low price. In this respect the *perpetual motion system* simply does not exist.

Proactive activities are primarily:

- active recruitment policy conducted close to potential candidates (not just mass advertising but reaching specific target groups with the message prepared accordingly - if we do not reach them first someone else will do it for us);
- maintaining competitive prices for standard specializations;
- improvement of the fundraising efficiency for supporting engineer's education (grants and ESF projects which enable partial financing of the staff from the university's extra-budgetary funds and allow at least partial reimbursement of the student's education costs as well as attractive scholarship system);
- educational tools investments which offer a guarantee of long-term use i.e. the purchase of the basic system module which may be developed by gradual expanding of its capacity and purchasing additional elements depending on what can be afforded;
- maintaining the staff's employment costs competitive in relation to the universities offering the same fields of study or specializations in order to prevent the outflow of the best workers to competitive centres.

9. CONCLUSIONS

An effective model of educating logistics engineers at the higher education level should combine two basic and binding principles in the

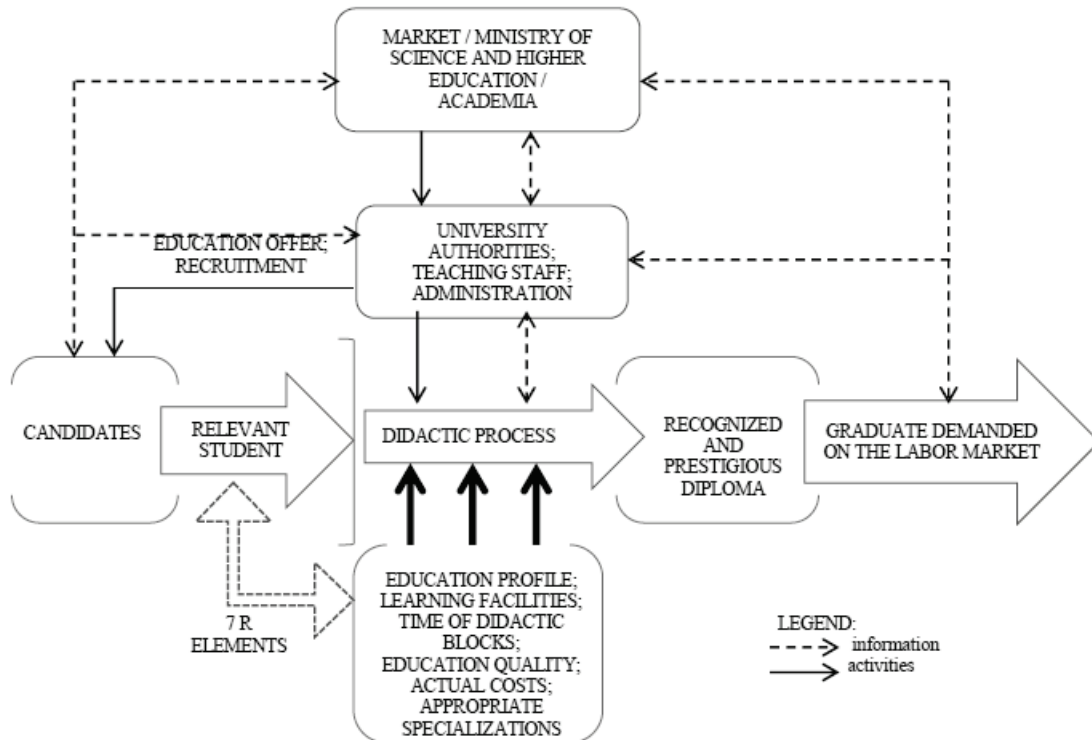


Fig. 4. The “7R” elements in the logistics engineers’ education system.
 Source: authors’ own.

economic practice. The first one is the marketing principle of meeting the client’s (student’s) needs “4P” (“4C”) and the second one is the logistic principle of “7R” in respect to the optimization and improvement of the processes’ efficiency. The proposed solution is a part of the logistics engineers’ education system (fig. 4). The model must include the synergy of expectations of the system stakeholders and lecturers (including practitioners), students, management and administration staff of the university. If one of these elements is weakened then the benefits of the proposed model will not be achievable in the long run. Summarizing, the main assumptions of the “7R” principle in logistics education are based on:

1. The right education model – engineer’s study in cooperation with the business partners, with the Entrepreneurship Council’s acceptance of the curriculum, direction: closer cooperation with businesses, acquiring new partners on the local TFL market, cooperation with scientific and technology parks, business incubators, logistics institutes, etc.;
2. The right student – the profiled education offer to meet the needs of the part-time student, the appropriate setting of the National Qualifications Framework and selection of the methods of education adequate for the researched student’s profile, emphasis on

reaching the students from the upper secondary logistics schools or people working as professional logistics, direction: strengthening the cooperation with the marketing department, reaching the upper secondary schools (students/graduates) and the TFL companies (workers with aspirations/necessity to complete their education in order to avoid the demographic decline effect) with a special benefits’ program;

3. The right place – the emphasis on education in laboratory conditions, using the appropriate software, direction: ultimate dual nature of the courses (approximately 50% of the practical courses including the training at the business partner’s office);
4. The right time – setting the block courses in thematic modules as an objective, the ultimate reduction of the students’ number of hours to 8 lesson units per day, direction: to start working on the “flexible class time” concept for dual courses and e-learning forms adequate to the new forms of education;
5. The right quantity – better specializations’ adjusted to the needs of the market but also prevention of “overproduction” of graduates with the education profile which does not comply with the needs of the market, reaching

- a consensus between the rights of the education service market and the labour market for graduates, coordination of the number of students and the opportunities of the labour market, direction: strengthen the cooperation with the business partners and regional Labour Offices in order to obtain information on professions, vacancies and fluctuation of logistics personnel, monitoring of the number of students and graduates, the studies on demand of the business partners with employment declaration;
6. The right quality – ensure greater competitiveness of graduates on the labour market, to improve recognisability of the university diploma, direction: introduction of certificates, recruitment of recognized specialists to conduct classes, the implementation of procedures for the voluntary “test of professional competence” which increases the “value” of the graduate on the labour market;
 7. The right costs – to support tendencies for maintaining didactic costs (staff, laboratories, systems) at the satisfactory level, to maintain competitive prices of studies, to increase the effectiveness of fundraising for education (grants, competitions, ESF), direction: to implement more expensive and exclusive/prestigious pilot programs including forms of *tutoring* and *coaching* with the guarantee of employment for specific job positions.
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