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Comparative study of assumed formal education effects for the professions of electrician and automotive technician with the expectations of employers on the labour market in Germany, Poland and Portugal

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INTRODUCTION

Supporting the economies of European Union member countries characterized by high level of employment and assuring economic, social and territorial coherence is one of the priorities of the „Europe 2020" strategy. The „Recognition of professional qualifications for the transfer needs on European labor market" project (ERASMUS+ program) fits in fulfillment of the strategy by creation of international instruments improving the mobility of vocational school graduates/employees.

Research regarding the precise definition of requirements of Polish, German and Portuguese entrepreneurships, recognitions of competences/professional qualifications obtained by means of formal educational systems and comparative studies: the expectations of Polish, German and Portuguese employers, formal education systems in these countries, performed within the project, have become a basis for the development of the *Comparative analysis of expected formal education effects for the profession of electrician and automotive technician with the expectations of employers on German, Polish and Portuguese labor market.*

The report gives answer to the question of the extent to which the vocational education effects for the profession of electrician and automotive technician in Partner countries meet the expectations of employers. The study includes the following issues:

1. Comparative analysis of educational effects in German with regard to the expectations of employers in Poland and Portugal.
2. Comparative analysis of educational effects in Poland with regard to the expectations of employers in Germany and Portugal.
3. Comparative analysis of educational effects in Portugal with regard to the expectations of employers in Poland and Germany.

The conclusions from the research regarding the assessment of consistency range for the educational effects and employers' expectations have become the inspiration to develop recommendations for the *Model for recognition of professional qualifications for the transfer needs on European labor market in Germany, Poland and Portugal.* The intention of the project partnership is to form a tool favorable to remove barriers regarding the mobility and employment of school graduates/employees for the profession of electrician and automotive technician on European labor market.

Chapter 1

Comparative analysis of educational effects in Germany (skills and professional competence) in relation to the expectations of employers in Poland and Portugal

Educational effects are represented by a combination of knowledge, skills and social competencies. Employers in all three partner countries were asked to rate four sets of them for each profession: two sets of professional competencies (KZ1 and KZ2), social and personal competencies (PSC) as well as key competencies (KC). It is important to know that knowledge was excluded from the German surveys because counsellors of HWK regarded the set as crucial and beyond dispute. The project manager agreed upon this procedure. This is why there will be neither an analysis of knowledge nor a comparison of this specific set with other partner countries.

Car Mechanics

NO.	PROFESSIONAL COMPETENCIES	POLAND	PORTUGAL	GERMANY
KZ 1	Fault diagnosis of the vehicle	4.6	4.0	4.3
KZ 2	Repairing parts and assemblies of motor vehicle	4.6	4.0	4.3

Professional competencies KZ1

When looking at how German employers evaluate professional competencies for automotive technicians, it is obvious that all skills are estimated as generally important as they reach from 4.1 to 4.5. KZ1.7, KZ1.9 and KZ1.11 are most important, whereas KZ1.4 and KZ1.8 are of lowest importance. Diagnosis of the vehicle is apparently a major part of the business in Germany and therefore of great relevance.

Polish employers mostly share the same opinion although there also some skills which they consider to be of clearly less relevance. These are KZ1.12 and KZ1.13 (both 2.8). It can be said that these two skills have no direct reference to the profession of car technicians working as employees for an enterprise.

Interviewees in Portugal show by their ratings that the whole set of skills is not of such importance, hence the importance indicator is between 2.4 (KZ1.12) and 3.7 (KZ1.7).

NO.	SKILLS	POLAND	PORTUGAL	GERMANY
KZ1.1	Obey the safety regulations, fire regulations, environmental protection and ergonomics within diagnosis of components of motor vehicles	4.3	2.5	4.4
KZ1.2	Prepare orders of service concerning diagnosis of a motor vehicle	4.2	3.3	4.2
KZ1.3	Classify motor vehicles	3.9	3.7	4.3
KZ1.4	Characterize the construction of motor vehicles and explain the principles of components and assemblies of such vehicles	4.3	3.5	4.1
KZ1.5	Observe the standards for technical drawing, machine parts, construction materials and supplies	3.4	2.7	4.2
KZ1.6	Recognizes the parts and electrical and electronic systems	3.7	3.2	4.3
KZ1.7	Use tools and measuring instruments to perform motor vehicle diagnostics	4.1	3.7	4.5
KZ1.8	Choose the method and define the scope of diagnostic components and combinations of motor vehicles	4.0	3.6	4.1
KZ1.9	Perform diagnostics of motor vehicles using measuring devices (engines, chassis, bodywork, tires)	4.0	3.5	4.5
KZ1.10	Interpret the results of diagnostic tests of motor vehicles	4.1	3.4	4.4
KZ1.11	Use computer programs used for the diagnosis of motor vehicles.	4.0	3.1	4.5
KZ1.12	Follow traffic rules	2.8	2.4	4.3
KZ1.13	Establishing and running his/her own business	2.8	2.5	4.3

Professional Competencies KZ2

In this category German employers appear to have a more differentiated view upon necessary skills because the value of the importance indicator ranges from 3.5 to 4.5. This means that the general estimation of the skills is on an average up to high level. The most important skills are KZ2.4 and KZ2.7 (both 4.5) and the least important ones are KZ2.9 and KZ2.13 (both

3.5). This shows that the location of errors and adequate repairing methods are very important for professionals in Germany.

Portuguese employers show again that they do not estimate the set of skills to be very important. Values of the importance indicator range from 2.4 (KZ2.9) to 3.9 (KZ2.10) which means that quality checks after finishing the repair work are rated important.
Interviewees from Poland show by their ratings that KZ2.13 (prepare estimated cost of repair) is of very low relevance to them. The other values range up to 4.6 (KZ2.4).

NO.	SKILLS	POLAND	PORTUGAL	GERMANY
KZ2.1	Obey the safety regulations, fire regulations, environmental protection and ergonomics within the repair of parts and assemblies of motor vehicles	4.1	3.4	4.4
KZ2.2	Use the technical documentation of machines and equipment	4.0	2.5	4.3
KZ2.3	Use the technical drawing of the mounting and installation work	3.7	3.1	4.3
KZ2.4	Locate damaged assemblies and subassemblies of cars	4.6	3.6	4.5
KZ2.5	Choose the methods of repair of motor vehicles	4.4	3.7	4.4
KZ2.6	Disassemble the assemblies and components of motor vehicles	4.2	3.2	4.4
KZ2.7	Select assemblies, subassemblies or their substitutes which are necessary to be replaced	4.1	3.8	4.5
KZ2.8	Replace damaged assemblies and components of vehicles using the equipment and workshop tools	4.4	3.5	4.3
KZ2.9	Choose supplies	4.0	2.4	3.5
KZ2.10	Control the quality of vehicle repair	4.2	3.9	4.0
KZ2.11	Perform periodic maintenance of vehicles	4.1	3.6	4.3
KZ2.12	Assess the quality of repair and determine its cost	3.6	3.1	3.8
KZ2.13	Prepare estimated cost of repair	2.9	3.8	3.5

Personal and social competencies (PSC)

Considering the importance indicator for German results one can see that the values do not show a wide range (3.9 to 4.2) but are on a general lower level than in the preceding tables. Professional confidentiality (PSC3) and being conscious of learning (PSC6) is most relevant whereas a feeling of responsibility (PSC1) as well as creativity (PSC2) and a consciousness about the performance as an individual or team (PSC4) are only little less important but still important.

Portuguese results clearly show that especially dealing well with stress (PSC7) is neglected. But nonetheless values range up to 3.9 (PSC3, PSC4).

Much like in Germany, Polish employers generally consider all competencies to be important but clearly outline the special relevance of a feeling of responsibility for performed tasks (PSC1).

NO.	PERSONAL AND SOCIAL COMPETENCIES	POLAND	PORTUGAL	GERMANY
PSC1	He/she feels responsible for the performed tasks connected with car diagnosis and repair	4.4	3.4	3.9
PSC2	He/she is creative and consistent in the implementation of tasks	4.0	3.3	3.9
PSC3	He/she respects professional confidentiality	3.8	3.9	4.2
PSC4	He/she can evaluate his/her actions and the actions of his/her team and takes responsibility for the consequences (within the car diagnosis and repair)	4.1	3.9	3.9
PSC5	He/she works well both on his/her own and within a group	4.2	3.6	4.1
PSC6	He/she recognizes his/her own learning needs, updates his/her knowledge and improves his/her professional skills	3.9	3.7	4.2
PSC7	He/she deals well with stress	3.9	2.7	4.0

Key competencies (KC)

First of all, it is important to note that KC9 and KC10 were not discussed in Poland. Therefore comparisons can only be made for Germany and Portugal. Interviewees from these two countries rate the two key competencies totally different as they are of minor importance (3.0 and 3.2) for Portuguese employers but of higher relevance for Germans (3.8 and 4.1).

Importance indicators for German answers range from 2.9 (KC4) to 4.1 (KC2, KC10). This means that leadership is of very low importance whereas teamwork and modern communication technology are important.

Portuguese employers show that obviously knowledge of maths (KC8) as well as reading and writing skills (KC7) are not too important. This tendency cannot be observed for Poland and Germany which is highly interesting.

Companies in Poland believe that skills in spoken languages including foreign languages (KC3) are least important (3.4). Problem solving (KC1) and mathematic skills (KC8) are most important to them which is a major contrast to Portuguese enterprises.

NO.	KEY COMPETENCIES	POLAND	PORTUGAL	GERMANY
KC1	Problem solving	4.4	3.6	3.9
KC2	Teamwork	4.1	3.8	4.1
KC3	Communication in the mother tongue and in foreign languages	3.4	3.4	3.7
KC4	Leadership skills	3.8	3.1	2.9
KC5	Planning and organizing work	4.2	3.5	3.9
KC6	Motor efficiency	4.1	3.6	3.9
KC7	The ability of comprehensive reading and writing	4.0	2.8	3.5
KC8	Mathematic skills	4.4	2.5	3.7
KC9	The ability to search, filter and critical analysis of information		3.0	3.8
KC10	The ability to use modern information and communication technologies		3.2	4.1

Electricians

Due to changes of the profession in Germany and also due to the fact that only energy and building technology was considered, the survey was customized to meet German circumstances best. The project manager agreed upon these changes. As KZ1 is totally neglected by the German system of vocational education, the decision was made to neglect it within this survey as well. This is why it will not be considered in the following analysis and comparison as well.

NO.	PROFESSIONAL COPETENCIES	POLAND	PORTUGAL	GERMANY
KZ 2	Installation and maintenance of electrical installations	4.5	3.9	4.5

Professional competencies KZ2

Importance indicators for results from Germany range from 3.5 to 4.4. Organizing and sticking to rules, standards and regulations (KZ2.1, KZ2.3), first aid (KZ2.2) and temporary connections and installations (KZ2.7, KZ2.8) are most important. Outdoor electrical installations (KZ2.10) are ranked lowest with the indicator of 3.5. This shows a focus on standards to ensure quality and security.

Polish employers mostly share this view and underline the importance of KZ2.1 by rating it 4.6 which is the highest value so far and KZ2.2 (4.4).

When looking at Portugal results are diverging a lot. Standards and security (KZ2.1, KZ2.2) have an indicator of 2.9-3.1 whereas the location of errors (KZ2.14) is estimated most important with 4.0. This shows that when it comes to working in another country adoptions might be needed.

NO.	SKILLS	POLAND	PORTUGAL	GERMANY
KZ2.1	Organize the workplace in accordance with the safety, fire, shock regulations, environmental protection and ergonomics when doing electrical installations	4.6	3.1	4.4
KZ2.2	Release people from voltage and rescue electrocuted ones	4.4	2.9	4.4

KZ2.3	Obey standards and regulations concerning the fitting of electrical installations	3.9	3.3	4.4
KZ2.4	Identify the types of electrical installations and characterize their structure	4.1	3.6	3.9
KZ2.5	Use the technical documentation of electrical installations	4.3	3.6	4.3
KZ2.6	Choose cables, fittings, tools and methods relevant to the fitting and repairing of various types of electrical installations	4.4	3.1	4.1
KZ2.7	Perform temporary connections	3.8	2.6	4.4
KZ2.8	Perform temporary installations	3.8	2.9	4.4
KZ2.9	Perform and renovate indoor electrical installations	4.2	3.7	4.2
KZ2.10	Perform and renovate outdoor electrical installations of the following types: telecommunication, signaling, protection of property and lightning	3.8	3.9	3.5
KZ2.11	Install building cable or aerial connections	4.1	3.1	3.9
KZ2.12	Perform connections of electrical and mechanical systems (bolted, clamping and soldered)	4.0	3.2.	4.0
KZ2.13	Check the correctness of functioning of internal and external electrical installations	4.0	3.3	4.1
KZ2.14	Locate and remove faults in internal and external electrical installations	3.8	4.0	4.2
KZ2.15	Exploit the equipment, installations and power grids with a voltage not exceeding 1kV	3.7	3.6	3.9
KZ2.16	Use simple technical documentation of machinery and electrical equipment	4.0	3.4	4.3
KZ2.17	Repair power tools and electric machines, exchange power cables with damaged insulation, replace brushes in commutator motor	3.2	3.5	3.8
KZ2.18	Exchange bearings in power tools and induction motors, sharpen drills and cutters and other metalwork	2.7	2.8	3.5

Personal and social competencies (PSC)

German results are almost uniform as they range from 3.6 (PSC1) to 3.9 (PSC3, PSC5). Answers clearly focus on professional confidentiality and teamwork as well as being able to work alone.

Huger differences can be found in Portuguese answers which show that PSC3 is clearly least important which is a great contrast to Poland and Germany. Therefore PSC6 is very relevant.

Polish employers roughly show the same opinion as Germany although they estimate the evaluation of actions (PSC4) as far more important than German employers.

NO.	PERSONAL AND SOCIAL COMPETENCIES	POLAND	PORTUGAL	GERMANY
PSC1	He/she feels responsible for the preformed tasks	4.5	3.6	3.6
PSC2	He/she is creative and consistent in the implementation of tasks	3.4	3.1	3.8
PSC3	He/she respects professional confidentiality	3.8	2.9	3.9
PSC4	He/she can evaluate his/her actions and the actions of his/her team and takes responsibility for the consequences	4.1	3.8	3.6
PSC5	He/she works well both on his/her own and within a group	4.2	3.4	3.9
PSC6	He/she recognizes his/her own learning needs, updates his/her knowledge and improves his/her professional skills	3.6	4.2	3.8
PSC7	He/she deals well with stress	3.4	2.8	3.8
PSC8	(He/she has good negotiating skills) was not offered for rating in Germany, it is not considered in this analysis.			

Key competencies (KC)

Key competencies are again regarded very different. German employers focus on the ability of problem solving (KC1) whereas Portuguese ones prefer mathematic skills (KC8).

It is interesting that in Portugal modern communication means (KC10) are significantly less important than in Germany and Poland and that team work (KC2) is not as important as maths.

NO.	KEY COMPETENCIES	POLAND	PORTUGAL	GERMANY
KC1	Problem solving	3.7	3.9	4.0
KC2	Teamwork	4.0	3.2	3.8
KC3	Communication in the mother tongue and in foreign languages	3.3	2.7	3.5
KC4	Leadership skills	2.1	2.7	2.8
KC5	Planning and organizing work	4.0	3.1	3.7
KC6	Motor efficiency	4.3	3.4	3.8
KC7	The ability of comprehensive reading and writing	4.1	3.3	3.4
KC8	Mathematic skills	3.3	4.0	3.7
KC9	The ability to search, filter and critical analysis of information	3.5	2.7	3.6
KC10	The ability to use modern information and communication technologies	3.8	2.1	3.4

In order to enable future users of the tool to easily recognize common and differentiating elements of vocational education for the profession of car mechanics and eletricians there will now be given an overview of learning contents in these professions in Germany and the set of competencies which employers in Germany, Poland and Portugal rate most important. As a result it will be clear for users from each of the three partner countries to see whether his or her vocational education was sufficient in order to meet the requirements of labour markets in the two partner countries. In addition to that the comparison of German learning contents with the demands of German employers is probably highly interesting as incongruities within the German educational system can be identified with ease. This part of the comparison was originally not part of the project but surely serves as a valuable extra feature of the analysis.

In the following, there will firstly be presented the results of car mechanics and secondly those of electricians.

Matches of learning contents and expected competencies were marked with colour in the following two tables. It is important to note that only those elements which undoubtedly share the same contents were marked. Therefore one should not neglect the fact that some oft he points that were not marked still incorporate equal contents.

Car Mechanics

Comparison of learning contents of vocational education of car mechanics in Germany and expectations of employers (KZ1 and KZ2)

	Professional competencies as expected by employers in Germany, Poland and Portugal																								
Learning content (LC) of vocational education in Germany	**Car Mechanics**	**KZ1**													**KZ2**											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
	LC1 Maintenance and care of vehicles or systems			■						■		■				■										■		
	LC2 Disassemble, repair and assemble simple technical vehicle subassemblies and systems				■		■			■		■						■	■	■						■		
	LC3 Identify and eliminate dysfunctions							■		■		■								■								
	LC4 Conduct re-fitting work according to customer requests																											
	LC5 Conduct inspections and additonal work											■														■		
	LC6 Diagnose and eliminate dysfunctions of onboard power systems, charcing current systems and starting systems							■		■		■								■								
	LC7 Repair technical vehicle subassemblies and systems due to wear											■										■	■					
	LC8 Diagnose mechatronic systems of power-train management systems									■		■																
	LC9 Conduct service tasks on comfort and safetysystems											■														■		
	LC10 Repair damages on chassis and breaking systems											■																
	LC11 Diagnose and repair networked power train, comfort and safety systems										■	■																
	LC12 Prepare vehicle for safety tests and technical acceptance		■									■																
	LC13 Repair drive components									■																		
	LC14 Equip, modify and refit systems and components								■																			

The analysis of 04 for car mechanics showed which competencies (KZ1 and KZ2) are ranked most important in each country. Please note that key competencies (KC) as well as personal and social skills (PSC) will be neglected as they are not part of the learning content. These were:

- Germany:
  - KZ1.7: Use tools and measuring instruments to perform motor vehicle diagnostics
  - KZ1.9: Perform diagnostics of motor vehicles using measuring devices (engines, chassis, bodywork, tires)
  - KZ1.11: Use computer programs for the diagnosis of motor vehicles
  - KZ2.4: Locate damaged assemblies and subassemblies of cars
  - KZ2.7: Select assemblies, subassemblies or their substitutes which are necessary to be replaced
- Poland:
  - KZ1.1: Obey the safety regulations, fire regulations, environmental protection and ergonomics within diagnosis of components of motor vehicles
  - KZ1.4: Characterise the construction of motor vehicles and explain the principles of components and assemblies of such vehicles
  - KZ2.4: Locate damaged assemblies and subassemblies of cars
- Portugal:
  - KZ1.3: Classify motor vehicles
  - KZ1.7: Use tools and measuring instruments to perform motor vehicle diagnostics
  - KZ2.10: Control the quality of vehicles repair

All in all the whole of competencies enlisted show that German employers and companies mostly focus on diagnosis and their employee's capability of handling modern technical equipment in order to identify problems with the help of highly specified devices. This is highly congruent with the learning contents of car mechanics as they focus on diagnosis of different systems as well. When looking at Poland with regard to the most important competencies one can find out that regulations as well as being able to identify the key features of different types of construction and possible damages within them shows a much more practical approach of Polish enterprises with focus on the actual passenger car instead of looking too much at devices which can be applied for diagnosis. As can be seen in the above table the learning content of vocational education for car mechanics does often cover the competencies that especially German employers regard as highly important whereas

competencies which are most important to Polish or Portuguese enterprises are not represented by the learning contents to such an extent. Nonetheless there are still several competencies for each bundle (KZ1 and KZ2) which apparently are not covered by German vocational learning contents or are at least not named in a similar way in the list of learning contents. This means that they could still be included. These competencies are:

- KZ2.1: Obey the safety regulations, fire regulations, environmental protection and ergonomics whithin the repair of parts and assemblies of motor vehicles.
- KZ2.3 Use the technical documentation of the mounting and installation work
- KZ2.9: Choose supplies
- KZ2.10: Control the quality of vehicle repair
- KZ2.12: Assess the quality of repair and determine its cost
- KZ2.13: Prepare estimated cost of repair

As pointed out before it is likely that they are nonetheless at least partially included in the learning content. Many of them are undoubtedly regarded as crucial and self-explanatory so that mentioning them appeared to be redundant.

Electricians

Comparison of learning contents of vocational education of electricians in Germany and expectations of employers (KZ2)

	Professional competencies as expected by employers in Germany, Poland and Portugal														
Learning content (LC) of vocational education in Germany	Electrician	KZ2													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	LC1 Analyse electrical systems and check functions															
	LC2 Plan and execute electrical installations															
	LC3 Analyse and adjust control systems															
	LC4 Make information technology systems available for use															
	LC5 Ensure electrical energy supply and the safety of operating equipment															
	LC6 Analyse and check equipment and sub-assemblies in plants															
	LC7 Program and realise control systems for plants															
	LC8 Select and integrate drive systems															
	LC9 Plan and realise communication systems in residential and functional buildings															
	LC10 Operate and repair electrical systems of building services															
	LC11 Set up, operate and repair energy systems															
	LC12 Plan and realise electrical plants															
	LC13 Maintain and adjust electrical plants															

According to employers in all three partner countries the preferred competencies for electricians were:

- Germany:
  - KZ2.1: Organise the workplace in accordance with the safety, fire, shock regulations, environmental protection and ergonomics when doing electrical installations
  - KZ2.2: Release people from voltage and rescue electrocuted ones
  - KZ2.3: Obey standards and regulations concerning the fitting of electrical installations
  - KZ2.7: Perform temporary connections
  - KZ2.8: Perform temporary installations
- Poland:
  - KZ2.1: Organise the workplace in accordance with the safety, fire, shock regulations, environmental protection and ergonomics when doing electrical installations
- Portugal:
  - KZ2.14: Locate and remove faults in internal and external electrical installations

Whereas German employers explain a strong focus on regulations and security measures such as first aid as well as connection and installation, the Portuguese ones underline the importance of diagnostic skills. As for Poland it can be stated that employers regard regulations as crucial as well so that they are fairly close to the opinion of their German colleagues. The analysis of learning contents of vocational education in this profession in Germany shows that apprentices are supposed to learn mostly about planning, installing and diagnosing electrical plants and information systems. In this context they should know all regulations that come along with their tasks. When comparing learning contents to expectations of possible future employers in Germany one can see that there are many common elements. But due to the fact that for reasons of practicability German project partners decided to focus on the discipline of energy and building technology there are of course some diverging learning contents especially in the field of energy technology when it comes to comparisons with expectations of employers in all three partner countries. Another point that is not clearly mentioned in the learning content refers to communication systems. Further competencies that might be more or less indirectly part of the learning content are:

- KZ2.1: Organise the workplace in accordance with the safety, fire, shock regulations, environmental protection and ergonomics when doing electrical installations
- KZ2.2: Release people from voltage and rescue electrocuted ones
- KZ2.10: Perform and renovate outdoor electrical installations of the following types: telecommunication, signalling, protection of property and lightning
- KZ2.12: Perform connections of electrical and mechanical systems (bolting, clamping and soldering)
- KZ2.18: Exchange bearings in power tools and induction motors, sharpen drills and cutters and other metalwork

Chapter 2

Comparative analysis of educational effects in Poland (skills and professional competence) in relation to the expectations of employers in Germany and Portugal

Comparative analysis of the effects of education in Poland in relation to employers expectations in Germany and Portugal, was carried out in the German Federal States on the basis of the interviews with 30 employers of the automotive industry companies and 33 companies from the electrical industry, while in Portugal, respectively, 30 and 31. The interviewed people answered the questions regarding the typical jobs or workplaces, as well as typical work actions. Additionally, those people were interviewed within the scope of requirements regarding the professional competences, knowledge and skills, personal and social competences and key competences.

AUTOMOTIVE TECHNICIAN

QUALIFICATION IN THE PROFESSION OF CAR MECHANIC IN POLAND	PROFESSIONAL COMPETENCES	PORTUGAL	GERMANY
Diagnosis and repair of components and assemblies of motor vehicles	Fault diagnosis of motor vehicles	4.0	4.3
	Repair of components and assemblies of motor vehicles	4.0	4.3

Professional competences

Fault diagnosis of motor vehicle and *repair of components and assemblies of motor vehicle*

The educational effects applicable for the qualification distinguished from the profession of car mechanic in Poland, i.e. Diagnosis and repair of components and assemblies of automotive vehicles, defined for the needs of the research as professional competences expected by German and Portuguese employees, and presented as: Fault diagnosis of automotive vehicle and Repair of components and assemblies of automotive vehicles, acquired, within the scale of expectations of German entrepreneurs with the use of five-point grading system, from unnecessary (=1) to key (=5), the grade 4.3, which means that they are very important, and grade 4.0 from employees hired by Portuguese companies. German interviewees also mentioned other professional competences, such as: maintenance of diagnostic systems, specialized fault localization, professional handling of different diagnostic

systems and education in the field of welding, which, in Polish educational system, correspond to the following actions learned and performed by students or the employees: one uses computer programs for vehicle diagnosis, locates damaged assemblies and components of automotive vehicles based on calculations and results of diagnostic tests and defines the scope of repair of motor vehicles.

Fault diagnosis of the automotive vehicle

With regard to the acceptance level of knowledge evaluated as key within all elements in case of Germany and skills related to the Fault diagnosis of automotive vehicle as key skills, i.e. with the highest grade – 4.5, the following were given by the German instructors and entrepreneurs: use of tools and measuring devices required to perform motor vehicles' diagnostics – which are also considered as the most significant factor in Portuguese companies – and perform diagnosis of motor vehicles by using measuring instruments (engines, chassis, body of the car, tires) as well as use of computer programs to diagnose the components and assemblies of automotive vehicles. By contrast, the most significant knowledge from the scope of fault diagnosis of automotive vehicles in Portugal is the knowledge regarding the diagnostic methods for automotive vehicles.

EDUCATIONAL EFFECTS IN POLAND	SKILLS	PORTUGAL	GERMANY
Distinguishes between concepts of occupational health and safety, fire protection, environment protection and ergonomics	Follow the rules and regulations regarding safety, fire protection, the ergonomics, environment protection with the scope of diagnostics of components of automotive vehicles	2.5	4.4
Accepts a motor vehicle to diagnose it and prepares documentation of this acceptance	Make a service request of a motor vehicle to be diagnosed	3.3	4.2
Distinguishes means of internal transport	Classify motor vehicles	3.7	4.3
Characterizes the construction of motor vehicles and explains the operation of components and assemblies of these vehicles	Characterize the structure of motor vehicles and explain the operation of components and assemblies of these vehicles	3.5	4.1
Uses technical documentation of machines and equipment and adheres to standards concerning technical drawing, machine	Adhere to standards concerning technical drawing, machine parts, construction materials and	2.7	4.2

parts, construction and consumables	consumables		
Identifies elements as well as electrical and electronic systems	Identify elements as well as electrical and electronic systems	3.2	4.3
Uses the tools and measuring instruments to perform motor vehicle diagnostics	Use of tools and measuring instruments to perform motor vehicles diagnostics	3.7	4.5
Selects methods and determines the scope of diagnosis of components and assemblies of vehicles	Select methods and determine the scope of the diagnosis of components and assemblies of vehicles	3.6	4.1
Uses tools and measuring instruments to perform the diagnosis of motor vehicles	Perform the diagnosis of motor vehicles with the use of measuring instruments (motors, system of chassis, vehicle body, tires)	3.5	4.5
Performs measurements and diagnostic tests of vehicles and interprets their results	Interpret the results of the diagnostic tests of motor vehicles	3.4	4.4
Uses computer programs to diagnose motor vehicles	Use of computer programs to diagnose motor vehicles	3.1	4.5
Applies the rules concerning road traffic and vehicle drivers	Apply the rules concerning road traffic and vehicle drivers	2.4	4.3
Prepares documentation necessary for starting and running a business	Start and run a business	2.5	4.3

There are really important skills required by German entrepreneurs and graded between 4.4 and 4.3. These are: regulations regarding safety, regulations regarding fire protection, environment protection and ergonomics within the scope of diagnostics of automotive vehicles' components as well as rules of interpretation of diagnostic test results, classification of automotive vehicles, identification of elements as well as electrical and electronic systems, apply road traffic regulations and car driving techniques and start and run a business. The educational effects in Polish educational institutions preparing for M.18 qualification for the profession of automotive technician, in line with the knowledge and skills expected by the employers from Germany and Portugal and related to Fault diagnosis of automotive vehicles are: use of tools and measuring devices for the performance of diagnostics of automotive vehicles, perform measurements and diagnostic tests of automotive vehicles and interpret of the results, use of computer programs for the diagnostics of automotive vehicles, select methods and determine the scope of diagnosis of the components and assemblies of automotive vehicles. In the second place, in terms of importance, German and Portuguese

entrepreneurs require, from their future Polish employees, the following qualifications, which can be achieved by them in Polish vocational schools, practical training centers or other educational institutions: accept a motor vehicle to diagnose it and prepare documentation of this acceptance, prepare the automotive vehicle for the diagnostics, characterize the structure of automotive vehicles and explain the rules of operation of the components and assemblies of these vehicles as well as define the components and assemblies of the automotive vehicle. The educational effects, common for all professions existing in Polish educational system, i.e. related to the health and safety protection, gained the grade 4.4 among German interviewees, while Portuguese instructors have assigned them a lower grade – 3.49. However, both grades were ranked second when taking into consideration the importance in terms of the level of knowledge and skills regarding the Fault diagnosis of automotive vehicle, similar to the basics of entrepreneurship in car industry and analogically to establishing and conducting an economic activity. The road traffic rules and car driving techniques considered by German interviewees as very important but, on the other hand, they are the least important for Portuguese interviewees, and define the skills that are the foundation of education i.a. for the profession of automotive technician in Poland, as well as skills used by the students in the field of electrical engineering and electronics.

Repair of parts and assemblies of automotive vehicles

In terms of competences linked with Repairs of parts and assemblies of automotive vehicles, during the validity tests it was revealed that the greatest attention of Portuguese companies was focused on basic knowledge about engines, structure and operation of automotive vehicles (drive system, braking system, steering system, bearings and propulsion elements of automotive vehicles, wheels and tires, automotive vehicle body) and on price list of services related to repair of parts and assemblies of automotive vehicles.

EDUCATIONAL EFFECTS IN POLAND	SKILLS	PORTUGAL	GERMANY
Distinguishes between concepts of occupational health and safety, fire protection, environment protection and ergonomics	Compliance with rules and regulations for safety, fire protection, environment protection and ergonomics within the scope of repair of parts and assemblies of automotive vehicles	3.4	4.4

Uses technical documentation of machines and equipment and adheres to standards concerning technical drawing, machine parts, construction and consumables	Use of technical documentation of machinery and devices	2.5	4.3
Uses technical drawing to perform assembly and installation works	Use of technical drawings for the performance of assembly and installation works	3.1	4.3
Locates damaged components and assemblies of motor vehicles on the basis of measurements and results of diagnostic tests	Locating damaged components and assemblies of automotive vehicles	3.6	4.5
Selects methods and defines the scope of repairs of motor vehicles	Selection of repair methods for automotive vehicles	3.7	4.4
Is able to remove assemblies and components of motor vehicles	Disassembling components and assemblies of automotive vehicles	3.2	4.4
Selects components or assemblies of motor vehicles or their substitutes to be replaced	Choosing components or assemblies of automotive vehicles or their substitutes for replacement	3.8	4.5
Replaces damaged components and assemblies of motor vehicles using workshop tools and equipment	Replacing damaged components and assemblies of automotive vehicles using workshop tools and equipment	3.5	4.3
Explains the rules for the operation of motor vehicles and selects supplies	Choosing consumable materials	2.4	3.5
Distinguishes between methods of quality control of the work performed	Controlling the quality of repair of repair of automotive vehicles	3.9	4.0
Performs actions of control and maintenance of vehicles	Performing periodic technical maintenance of automotive vehicles	3.6	4.3
Assesses the quality of performed repair and determines its costs	Assessing the quality of performed repair and determining its costs	3.1	3.8
Estimates repair costs of vehicles	Preparing a cost estimate of repair	3.8	3.5

When skills are taken into consideration, according to the interviewees, the most significant are: choosing components or assemblies of automotive vehicles or their substitutes for replacements and preparing a cost estimate of repair, while choosing consumable materials is

non-significant. Similarly, the highest grade among German entrepreneurs, instructors and employees was obtained by skills of locating damaged components and assemblies of automotive vehicles and choosing components or assemblies of automotive vehicles or their substitutes for replacements, together with the elements regarding compliance with the regulations of safety and environment protection. All of these skills comply with the following educational effects relevant for the qualification distinguished for the profession of automotive technician in Polish educational system: locating damaged components and assemblies of automotive vehicles based on measurements and results of diagnostic testing, estimating the costs of repair of automotive vehicles, selection of method and definition of the scope of repair of automotive vehicle, disassemble and verification of components and assemblies of automotive vehicles, choosing components or assemblies of automotive vehicles or their substitutes for replacements.

Personal and social competences

EDUCATION EFFECTS IN POLAND (PERSONAL AND SOCIAL COMPETENCES)	PERSONAL AND SOCIAL COMPETENCES	PORTUGAL	GERMANY
One is able to take responsibility for his/ her own actions	He/she feels responsible for the preformed tasks connected with car diagnosis and repair	3.4	3.9
One is creative and consistent in the implementation of tasks	He/she is creative and consistent in the implementation of tasks	3.3	3.9
Respects professional confidentiality	He/she respects professional confidentiality	3.9	4.2
One is able to expect implications of the actions	He/she can evaluate his/her actions and the actions of his/her team and takes responsibility for the consequences (within the car diagnosis and repair)	3.9	3.9
Cooperates in a team	He/she works well both on his/her own and within a group	3.6	4.1
Updates knowledge and improves professional skills	He/she recognizes his/her own learning needs, updates his/her knowledge and improves his/her professional skills	3.7	4.2
Deals well with stress	He/she deals well with stress.	2.7	4.0

In terms of personal and social competences, German and Portuguese interviewees are very consentaneous. The most significant competences with grade 4.1-4.2 in Germany and 3.9 in Portugal are: respecting professional confidentiality, recognition of learning needs, updating and improving the knowledge and professional skills, responsible evaluation of team actions together with consequences. The personal and social competences in Polish educational institutions and corresponding to competences that exist in German and Portuguese educational systems are: respecting professional confidentiality, updating the knowledge and improving professional competences, cooperation within the team and being responsible for the performed actions.

Key competences

KEY COMPETENCES	PORTUGAL	GERMANY
Problem solving	3.6	3.9
Teamwork	3.8	4.1
Communication in the mother tongue and in foreign languages	3.4	3.7
Planning and organizing work	3.5	3.9
Motor efficiency	3.6	3.9
The ability of comprehensive reading and writing	2.8	3.5
The ability to search, filter and critical analysis of information	3.0	3.8
The ability to use modern information and communication technologies	3.2	4.1

The above- mentioned cooperation in a team that is used to characterize Polish student and a future employee is considered in German and Portuguese companies and entrepreneurships as a key competence. When other top rated key competences are taken into consideration, there is a consistency among the interviewees from Germany and Portugal. All of the employees mentioned: the ability to use modern information and communication technologies, problem solving, planning and organizing work and motor efficiency. The future Polish employee must be creative and consistent in the implementation of tasks, shall use modern computer programs supporting the performance of the given tasks and shall

predict the effects of the performed actions. The school has a task to prepare the student to communicate in the mother language and in foreign languages. This key competence was graded 3.7 according to the German entrepreneurs and employees and 3.4 according to the Portuguese employees.

ELECTRICIAN

Comparative analysis of educational effects in Poland in relation to the expectations of employers in Germany and Portugal was conducted in the German Federal States on the basis of 33 interviews with employees of the electrical industry and 31 interviews conducted in Portugal with the employees of the electrical industry as well. The respondents were asked to answer the questions about typical workplaces or workstations, as well as typical work activities. Additionally, they were asked about requirements for professional competence, knowledge and skills, personal and social competences and key competences.

QUALIFICATION IN THE PROFESSION OF ELECTRICIAN IN POLAND	PROFESSIONAL COMPETENCE	PORTUGAL	GERMANY
Installation and maintenance of machinery and electrical equipment	Installation and maintenance of machinery and electrical equipment	4,1	5,0
Installation and maintenance of electrical installations	Installation and maintenance of electrical installations	4,0	4,5

Professional competences

The educational effects corresponding to the distinguished qualification for the profession of electrician in Poland, i.e. E.7. Installation and maintenance of machinery and electrical equipment and (within the German educational system there is no such competence for the profession of electronics engineer with energy and construction technologies specialization) and E.8. Installation and maintenance of electrical installations, obtained in the assessment of expectations of Portuguese employers in a five- point scale where 1 is unnecessary and

5 is crucial, were graded in the following order: 4,1 and 4,0, which means they are immensely important and grade 4.5 indicating the level between very important and key (applies to competence: Installation and maintenance of electrical installations) from employees hired for German companies.

Installation and maintenance of machinery and electrical equipment

Regarding the knowledge acceptance level from the scope of installation and maintenance of machinery and electrical equipment, the most significant, in case of Portugal, are devices and measurement methods and knowledge about the machinery and electrical equipment (kinds, characteristics, classification). The elements linked with knowledge are considered in Germany as having the greatest significance, that is why the interviewees in the research focused only on evaluation of the professional competences with reference to abilities and skills. The most important skills required by Portuguese entrepreneurships and having the grades of 4.1, 4.0 and 3.9 are respectively: Locating typical damages of machinery and electrical equipment, performing the replacement of used and damaged parts and components of machinery and electrical equipment and distinguishing the differences between the parameters of elements and assemblies of machinery and electrical equipment and defining their functions. The educational effects in Polish educational institutions preparing for the E.7 qualification for the profession of electrician, convergent with the knowledge and skills expected by the employers from Portugal and related to the Installation and maintenance of machinery and electrical equipment are: Locating typical damages of machinery and electrical damages, differentiating the parameters of elements and assemblies of machinery and electrical devices, defining the functions of elements and assemblies used in machinery and electrical devices, replacement of used or damaged elements and assemblies of machinery and electrical devices.

Installation and maintenance of electrical installations

In accordance with the survey performed among the employees of Portuguese companies within the area of Installation and maintenance of electrical installations it can be seen that there is a growth in the level of importance of knowledge about the equipment, tools and methods used for electrical installations. The future employee hired in Portuguese

entrepreneurship must have a very good knowledge about the structure and types of electrical installations, rules and methods of conduct in case of electrocution as well as standards and regulations regarding the fitting of electrical installations. Polish schools and educational institutions, implementing the core curriculum for the profession of electrician, prepare the syllabus, based on which the set of educational effects representing a framework for education within this profession is created. The educational effects common for the employees within the scope of electrical engineering-electronics area, which include the profession of electrician, fulfilling the expectations of Portuguese employers and considered as the most important by them, the following correspond to them within the Polish educational system: selection of methods and devices for measurement of parameters of electrical and electronic systems, selection of tools and measurement devices and performance of tasks from the scope of mechanical installation of electrical and electronic elements and devices as well as works within the scope of manual treatment; whereas the educational effects corresponding to the qualification of Installation and maintenance of electrical installations: differentiating the wires used in electrical installations, recognition of installation equipment, recognition of light sources and fixtures, definition of technical parameters of electrical installations and installation equipment, verification of conformity of the assembly of electrical installation with the wiring diagram. After finishing the vocational education, the graduates of Polish schools and educational institutions are prepared within the scope of Occupational health and safety defined as educational effects common for all professions. That is why they can easily fulfill the expectations without any problems, within the scope of these professional competences, not only of Portuguese but also of German entrepreneurships. Interviewees from German companies and work places placed the highest grades – on the same level – following 5 professional competences within the area of Installation and technical maintenance of electrical installations corresponding to the Polish educational effects within the area of Occupational health and safety and educational effects of the E.8. qualification (installation and maintenance of electrical installations): organizing the worksite in accordance with the regulations regarding occupational health and safety, fire protection, environment protection and ergonomics during the execution of electrical installations, methods of releasing and rescuing the people in case of electrocution, adhering to applicable standards and regulations in the performance of electrical installations. On the other hand, the professional competences, highly graded by German interviewees and defined as performance of temporary connections and performing temporary installations, performing the cable or aerial connection of buildings, as well as lower graded: operating devices, installations and

electricity networks of voltage not exceeding 1kV, replacing the bearings in electrical tools and induction motors, sharpening drills and chisels and performing other locksmith actions, do not exist directly in Polish educational system as educational effects for the profession of electrician, although their parts are hidden under more general terms. These competences are gained by Polish students or graduates during specialized training and courses that finish with an exam and give certain qualifications. People interested may join them during their last year at vocational school or at any time after graduating. Very important skills, required by German entrepreneurs and having 4.3 and 4.2 grades, are: Use of technical documentation of electrical installations and interior electrical installations. The following educational effects in Polish educational system, common for the professions within the scope of electrical engineering-electronic area, correspond to the skills regarding the technical documentation: use of technical documentation, illustrated parts catalogues and maintenance manuals and compliance with the standards within such scope, whereas for the rest correspond the educational effects relevant to the E.8 qualification (Installation and maintenance of electrical installations) distinguishe from the profession of electrician, i.e. the recognition of typical damages of electrical installations, selection of tools for the installation and removal of electrical installation elements, performance of replacement of damaged wires and assemblies of electrical installations.

EDUCATIONAL EFFECTS IN POLAND	SKILLS	PORTUGAL	GERMANY
Distinguishes between concepts of occupational health and safety, fire protection, environment protection and ergonomics	Organize the workplace in line with the rules and regulations for occupational health and safety, fire protection, environment protection and the ergonomics during the performance of electrical installation.	3.1	4.4
Gives first aid needed in accidents at work and in the state of health and life hazards	Release persons that were electrocuted from voltage and rescue them.	2.9	4.4
Complies with the rules concerning installation of electrical systems in residential and industrial buildings	Adhere to the applicable standards and regulations in the performance of electrical systems	3.3	4.4
Specifies the technical parameters of electrical and	Identify the type of electrical systems and	3.6	3.9

technical installations	characterize their structure		
Checks compliance of the electrical installation with the scheme	Use the technical documentation of electrical systems	3.6	4.3
Selects the tools to perform different types of electrical installations	Choose cables, accessories, tools and methods relevant to the performance and repair of various types of electrical systems	3.1	4.1
----------	Perform temporary connections	2.6	4.4
----------	Perform temporary systems	2.9	4.4
Traces the routing of wires and locates the installation equipment on the basis of the scheme. Performs replacement of damaged cables and electrical systems components	Perform and repair internal electrical systems	3.7	4.2
Performs maintenance of electrical installations according to the documentation	Perform and repair external electrical systems: teletechnical, signaling, protection of property and lightning protection	3.9	3.5
----------	Perform cable connections or overhead connections of buildings	3.1	3.9
Performs connections between electrical components according to the circuit diagram and assembly. Traces the routing of the wires and position of installation equipment on the basis of the scheme	Perform connections of electrical and mechanical systems (bolted, clamp and soldered)	3.2	4.0
Checks the operation of the electrical system after the assembly is made	Check the correctness of operation of internal and external electrical systems	3.3	4.1
Recognizes typical damage to the electrical installations. Performs replacement of damaged cables and components of electrical installation	Locate and remove defects in internal and external electrical systems	4.0	4.2
----------	Operate devices, electric power systems and grids with voltage not exceeding 1 kV	3.6	3.9
Performs measurements of system parameters and security according to the scheme.	Use simple operation and maintenance documentation of	3.4	4.3

Performs connection between the electrical components according to the circuit diagram and assembly	electrical machinery and devices		
Performs replacement of damaged wires and components of electrical installations	Repair power tools and electrical machinery, replace power supply cables with damages insulation, replace brushes in commutators.	3.5	3.8
----------	Replace bearings in power tools and induction motors, sharpen drills and cutters, other locksmith works	2.8	3.5

Personal and social competences

EDUCATIONAL EFFECTS IN POLAND (PERSONAL AND SOCIAL COMPETENCES)	PERSONAL AND SOCIAL COMPETENCES	PORTUGAL	GERMANY
One is able to take responsibility for his/ her own actions	He/she feels responsible for the performed tasks	3.6	3.6
One is creative and consistent in the implementation of tasks	He/she is creative and consistent in the implementation of tasks	3.1	3.8
Respects professional confidentiality	He/she respects professional confidentiality	2.9	3.9
One is able to expect implications of the actions	He/she can evaluate his/her actions and the actions of his/her team and takes responsibility for the consequences	3.8	3.6
Cooperates in a team	He/she works well both on his/her own and within a group	3.4	3.9
Updates knowledge and improves professional skills	He/she recognizes his/her own learning needs, updates his/her knowledge and improves his/her professional skills	4.2	3.8
Deals well with stress	He/she has good negotiating skills	2.8	3.8
Can negotiate the terms of agreements	He/ she can negotiate the terms of agreements	1,8	--

The most significant personal and social competences recognized by Portuguese respondents are: He/she recognizes his/her own learning needs, updates his/her knowledge and improves his/her professional skills; He/she can evaluate his/her actions and the actions of his/her team and takes responsibility for the consequences and He/she feels responsible for the performed tasks. On the other hand, the most important competences for German entrepreneurs and employees are: He/she respects professional confidentiality and He/she works well both on his/her own and within a group. In the second place the interviewees from Germany provided 3 elements of social and personal competences that gained the same importance grade. These are: he/she is creative and consistent in the implementation of tasks, he/she recognizes his/her own learning needs, updates his/her knowledge and improves his/her professional skills and he/she deals well with stress. Personal and social competences formed and developed within Polish educational institutions and corresponding to competences existing in German and Portuguese educational system are: creativity and consequences within the performance of tasks, propensity to change, respecting professional confidentiality, updating the knowledge and improving the professional skills, teamwork, taking responsibility for the performed actions, dealing well with the stress and ability to negotiate the terms of agreement.

KEY COMPETENCES	PORTUGAL	GERMANY
Problem solving	3.9	4.0
Teamwork	3.2	3.8
Communicating in the mother tongue and in foreign languages	2.7	3.5
Leadership skills	2.7	2.8
Planning and organizing work	3.1	3.7
Motor efficiency	3.4	3.8
The ability of comprehensive reading and writing	3.3	3.4
Mathematic skills	4.0	3.7
The ability to search, filter and critical analysis of information	2.7	3.6
The ability to use modern information and communication technologies	2.1	3.4

When taking into consideration the highest graded key competences, there is a huge concurrence of acceptance level between the interviewees from Germany and Portugal. The key competence with the highest importance indicator – key competence graded 4.0 among German entrepreneurs and employees is problem solving, furthermore teamwork, motor efficiency with 3.8 grade, as well as planning and organizing work and mathematic skills that obtained 3.7 mark. The highest mark – 4.0, was granted by interviewees from Portuguese entrepreneurships and companies to mathematic skills. Problem solving was considered in Germany as the most important, while in Portugal it was placed second with 3.9 grade. The motoric efficiency, teamwork and planning and organizing work obtained grades: 3.4, 3.2 and 3.1 respectively. The future Polish employee has to be creative and consistent in the implementation of tasks. The educational effects common for all of the professions within the frameworks of electrical engineering-electronics and the educational effects proper for the qualifications distinguished for the profession of electrician, on which the Polish school is placing the greatest effort, are based on problem solving, planning and organizing work, as well within a team. During the first year of education in syllabus for the profession of electrician the students are prepared for gaining common knowledge, participating in theoretical activities, learning mathematic skills needed for future practical education. During the subsequent years of education together with the growth of number of practical education subjects there can be seen a gradual increase of students' motor efficiencies, which are verified within the practical part of the exam confirming the professional qualifications.

The following comparative analysis of educational effects in Poland performed with reference to the expectations of employers from Germany and Portugal demonstrates a very huge consistency between the expectations of employers and the effects of formal education obtained by the graduates for the profession of electrician and automotive technician. Research testing oriented on measurement of the acceptance level of professional tasks, professional competences, knowledge and skills, personal and social competences and key competences was used for this analysis. Almost in each case, all of these elements existing within the research, including all of the competences, knowledge and skills verified in our partner countries, have their analogous equivalents within the educational effects common for all professions, educational effects common for the professions within the frameworks of electrical engineering-electronics and mechanical/mining-metallurgical as well as the educational effects characteristic for the qualifications distinguished for the profession of electrician and automotive technician existing in Polish educational system.

Chapter 3

Comparative analysis of educational effects in Portugal (skills and professional competence) in relation to the expectations of employers in Poland and Germany

ELECTRICIANS

Professional Competences

Installation and maintenance of electrical machinery and electrical equipment and of electrical installations are evaluated by Portuguese employees almost on the same level which suggest that both tasks are of almost equal importance. Polish employees considered the installation and maintenance of electrical systems more important. German employees think that installation and maintenance of electrical installations is of most importance and is a key competence.

Knowledge and Skills

Installation and maintenance of machinery and electrical equipment

The most significant knowledge on the field of installation and maintenance of machinery and electrical equipment for Portuguese people is the measurement instruments and methods and the knowledge of electrical machinery and equipment, the least important factor is about the rules of establishing and running business.

For Polish employees, the most important knowledge is constituted by rules and regulations for occupational health and safety, fire protection, environment protection and the ergonomics during the installation and maintenance of electrical machinery and devices. They agreed with the Portuguese that the least important knowledge is rules of establishing and running business. The Germans had similar responses as the Polish.

As far as the skills concerned the location the typical damage of machinery and electrical equipment is of the most relevance, classify machines and electrical equipment, determination of their technical parameters is the least important skill. For Polish employees skills in distinguishing between structural materials used in the electrical machinery and equipment are of little importance (minor) (3,2), the same applies to establishing and conducting an economic activity in the electrical industry (2,1).

Installation and maintenance of electrical installations

According to the Portuguese interview with employees in the last few years there has been a growing importance of the knowledge about equipment and tools, the methods as well, in order to live up to the growing expectations of the labour market. Due to that fact compared with other areas it is the most important factor. Whereas knowing rules and methods of exchanging bearings in power tools and induction motors, sharpening drills and cutters and other metalwork are playing not a vital role in the profession of electricians. For German people these are more important: organize the workplace in accordance with the safety, fire, shock regulations, environmental protection and ergonomics when doing electrical installations, release people from voltage and rescue electrocuted ones , obey standards and regulations concerning the fitting of electrical installations , perform temporary connections and perform temporary installations . The Polish interviewers agreed with the Germans, on the 3 most important items related to knowledge.

Investigating the skills of this field the conclusion can be drawn from the indicators that all of them are almost the same level, in the views of companies the skill location and removing faults in internal and external electrical installations is the most relevant. For Polish is very important to be able to organizing the workplace in line with the rules and regulations for occupational health and safety, fire protection, environment protection and the ergonomics during the performance of electrical systems and least important to replace bearings in power tools. Germans agreed with the Polish on the most important skill and the least important skill.

Personal and social competences

There are distinct differences between the lowest and highest indicators. According to the Portuguese interviewees the most relevant competence is recognizing the learning needs, possessing update knowledge and improvement professional skills. Contrary to that possessing good negotiating skills is of the least relevance. For German people the most important social competences are the respect for confidentiality and the ability to work alone or in a group. Polish consider the responsibility of the execution of task of most importance, and negotiating the terms of arrangements the least important

MECHANICS

Professional competence

Fault diagnosis of the vehicle and repairing parts and assemblies of motor vehicle are evaluated by the employees on the same level by the Portuguese interviewees which suggest that both tasks are of almost equal importance. The Polish agree in this topic, as are their German colleagues.

Knowledge and skills

Fault diagnosis of the motor vehicle

As can be seen the most significant knowledge on the field of fault diagnosis of the motor vehicle is the knowledge about methods of diagnosis of motor vehicles, the least important factor is about the traffic rules and driving technique. The German people consider all the knowledge items as crucial, whereas the Polish think that the rules and regulations for occupational health and safety are the most important.

As far as the skills concerned classifying motor vehicles is of the most relevance, it is very important to remark that use tools and measuring instruments to perform motor vehicle diagnostics is signed on the same level. Following traffic rules is the least important skill. The Polish consider compliance with rules and regulations for occupational health and safety as a very important skill, and establishing and conducting an economic activity as least important. The Germans agree about the safety regulations as being an important skill, but think that choosing the method of diagnosing components is least important.

Repairing parts and assemblies of motor vehicles

Investigating the relevance of different professional competences and compared that with each other on the area of repairing parts and assemblies of motor vehicles, considerable attention has been paid to the basic knowledge on engines.

For Portuguese employees the importance indicators of the knowledge about construction and operation of motor vehicles (drive system, brake system, steering system, bearing and the driving elements of motor vehicles, wheels and tires, body of motor vehicles) and about price list of the services connected with the repair of parts and assemblies of motor vehicles are most significant on the same level. The Germans consider that locating damaged assemblies

and subassemblies of cars and selecting assemblies, subassemblies or their substitutes which are necessary to be replaced are most important. Their Polish colleagues considered construction and principle of operation of motor vehicles to be the most important knowledge and that the price list of repair of components and assemblies of motor vehicles is the least important

As far as the skills concerned, Portuguese employees considered that the most relevant skills are with the same indicators select assemblies, subassemblies or their substitutes which are necessary to be replaced and preparation estimated cost of repair, whereas choice of supplies is not of relevance. For Polish, locating the damaged components and assemblies of passenger vehicles was considered the most important skill, whereas preparation of a cost estimate of repairs is deemed minor. Germans think that obeying the safety regulations and fire regulations is the most important skill, and agree with their Polish and Portuguese colleagues that the choosing of supplies and preparing estimated costs of repair are not so important.

Personal and social competences

According to the Portuguese research there are numbers of similarities between the indicators, the most relevant competences are respecting of professional confidentiality and responsible evaluation his/her actions and the actions of his/her team and takes responsibility for the consequences (within the car diagnosis and repair). Contrary to them dealing well with stress is of the least relevance.

Germans agree with Portuguese people regarding the importance of respecting professional confidentiality and think that it is also important that he/she recognizes his/her learning needs, and updates his/her knowledge and improves his/her professional skills. Some of the interviewed individuals added further social and personal competencies that appeared necessary to their eyes. Two interviewees mention he/she is able to understand and imagine connections and processes and rank it very important. In addition to that he/she keeps track of existing and necessary processes and he/she has the ability of logical thinking estimated as crucial. The least important personal and social competence was considered the amount of creativity in the implementation of the ask, but it still scored well. The Polish employees think that it is important that is of great importance He/she is responsible for the execution of tasks related to the diagnosis and repair of motor vehicles. They considered all personal and social competences important.

Chapter 4

Conclusion and recommendations for an initial Model for recognition of the vocational qualifications for transfer needs on European labour market in Germany, Poland, Portugal with reference to the professions of electrician and automotive technician

The conducted comparative analysis of educational effects in Germany, Poland and Portugal in relation to the expectations of the employers in these three countries demonstrates both the compatibility between the expectations of the employers and the effects of formal education that is obtained by the graduates in the professions of an automotive technician and electrician. It also demonstrates differences in assessments of significance of the competence of employees on typical workplaces in the above- mentioned professions. Research testing in German, Polish and Portuguese companies was oriented on measurement of the acceptance level of professional tasks, professional competences, knowledge and skills, personal and social competences and key competences.

In the German classification of occupations and specialties for the needs of the labor market there is a profession of an electrician- major: energy and building technologies. The equivalent of the German profession recognized in Portuguese and Polish classifications of occupations of vocational education is the profession of an electrician. A car mechanic, located in the national occupation framework in Poland is equivalent to a passenger cars mechanic in Portugal and a vehicle mechatronic in major: passenger cars mechanic in Germany.

The knowledge raised by graduates of vocational schools is treated by the German entrepreneurs as having the greatest importance. That is why the employers in Germany focus on the assessment of professional competence of their future employees in relation to their abilities and skills.

The most important, in terms of installation and maintenance of machinery and electrical equipment, (in German education system, in the profession of an electronic engineer specializing in energy and building technologies, there is no such competence) are the skills in occupational health and safety, which future electricians working in Portuguese and Polish labor markets need to have. Analyzing the effects of education in these countries, which are confirmed by the professional exam for the profession of an electrician, it can be stated that despite the different location of these professions in the National Qualification Framework in each of the countries they still have very many common learning outcomes in this area. For the installation and maintenance of electrical installations the most important skills that the future employee in Polish, German and Portuguese labor markets should acquire are: identifying types of electrical installations and characterizing their structure, making and renovating the internal electrical installations and making and renovating external electrical

installations: telecommunication, signaling, protection of property and lightning systems. The graduates of schools and educational institutions after finishing vocational training and passing the examinations which confirm vocational qualifications in the profession of an electrician meet the expectations of the employers in these three countries. However, in each of them there is a different emphasis on each of the elements, such as: knowledge and skills as professional competences, personal and social competences and key competences.

The situation is similar in the professions of car mechanics, passenger car mechanics and automotive mechatronics, specialty passenger car technician.

The skills that are highly rated by the employers from Germany, Poland and Portugal, and not occurring directly in the education systems as learning outcomes for the aforementioned professions in these countries, may be gained by the students or graduates on the specialized training and courses that finish with an examination and giving specific qualifications.

The objective of the comparative analysis of educational effects in each of the countries that takes part in the research of employers' expectations on the labor market is to develop a model to recognize professional qualifications for the transfer on the European labor market in Germany, Poland and Portugal for professions of an electrician and car mechanic. Therefore, this model should identify areas of competence, within which the level of knowledge, skills, personal and social competence and key competences are fundamentally different from the expectations of employers in the country concerned, which should be strengthened through lifelong learning to equal the chances of graduates on the European labor market.

It would be helpful in the comparison of expectations of the employers hiring workers on typical workplaces in the professions of an electrician and car mechanic together with the self- assessment of skills and qualifications of the graduate (self- assessment questionnaire).

An important feature of the model would also be the analysis how to obtain vocational qualifications in different countries (a description of the path that makes it possible to obtain the profession) and the supporting documents confirming obtaining of the profession.