

The impact of competencies on employability in Poland

KAMILA TOPOLEWSKA

Bydgoszcz University of Science and Technology, Faculty of Management, Department of Economics and Marketing, ul. Fordońska 430, 85-790 Bydgoszcz, Poland

✉ kamila.topolewska@pbs.edu.pl

 orcid.org/0000-0003-1942-1115

Abstract

Motivation: Employee competencies are some of the most important elements of human resources management. Their value is clear even at an early stage of an employee selecting process because the hiring of a qualified employee can significantly reduce the costs related to training. Although the remuneration of qualified workers is usually higher, there is one key balancing aspect at play here, namely the fact that high level of knowledge and skills of a team allows for easier adaptation to changing market conditions. These competencies also have a similar value in case of other processes, such as: assessment, motivation, and employee development. Thus, considering their importance, it seemed worthwhile to analyse the impact of competencies on employability, both from the point of view of an organization and the labor market.

Aim: The aim of the work is to determine the impact of individual characteristics and professional competencies on the likelihood of employment.

Results: Based on the logit model estimates, it might be concluded that the following factors have the greatest positive impact on employability: age 41–50, having a driving license, higher education, readiness to work unusual hours required by the employer, and the ability to operate machines, tools and technical devices. The features that adversely affect the employability of the surveyed individuals include: lack of readiness to work unusual hours required by the employer, female gender, and lack of the ability to analyse information and draw conclusions.

Keywords: *employability; competencies, logit model*

JEL: J21; J24; C53

1. Introduction

Employee competencies are some of the most important elements of human resources management. Their value is clear even at an early stage of an employee selecting process because the hiring of a qualified employee can significantly reduce the costs related to training. Although the remuneration of qualified workers is usually higher, there is one key balancing aspect at play here, namely the fact that high level of knowledge and skills of a team allows for easier adaptation to changing market conditions. These competencies also have a similar value in case of other processes, such as: assessment, motivation, and employee development. Thus, considering their importance, it seemed worthwhile to analyse the impact of competencies on employability, both from the point of view of an organization and the labor market.

The aim of the work is to determine the impact of individual characteristics and professional competencies on the likelihood of employment. The conclusions were based on the estimates of a Binary Logit model. The data used for the estimation was taken from the Study of Human Capital in 2019, and a total of 2,401 observations were used.

Employability is defined in many ways in the literature, and the concept itself has evolved over the years. At the beginning of the 20th century, it was mainly considered from the point of view of people's ability and readiness to work, but in the 1950s emphasis was placed on three aspects: socio-medical, workforce and cyclical. The first referred to the possibility of engaging in a professional activity from the medical point of view, as well as individual social and educational predispositions. The second focused on combining medical issues with people's competences and factors determining their social acceptance (e.g., appearance). The last aspect included an analysis of the phases of a business cycle and assumed support for the unemployed in the period of reduced demand for labor. In the 1980s, employability was considered from the point of view of next three variants: initiative, interactivity, and relation with labor market performance. Regarding the initiative, it was assumed that individual skills and the development of human and social capital are key for a success on the labor market. Other important elements included lifelong learning, increased access to information on the labor market, and making the market itself more flexible. In the case of interactivity, it was pointed out that the employability of people depended on the interaction between the dynamics of the labor market in a given sector and the skills of the individual. The third variant assumed an assessment and comparison of labor market results by means of statistical models (e.g., forecasting the period of employment in a year or the average pay rate for an hour of work). Multiplication of selected variables could be used as an indicator enabling comparisons in particular periods (Wiśniewska, 2015b, pp. 12–13).

Competences are essential from the point of view of employability. An approach which considers their impact on employment might focus primarily

on identifying the gaps in knowledge, skills and attitudes and filling them by developing these elements in the human capital (Römgens et al., 2020, p. 2590).

One of the definitions of employability indicates that it encompasses knowledge, skills and several personal characteristics which determine employment security and generally perceived success on the labor market (Yorke & Knight, 2006, p. 3).

Another definition specifies that the potential for a professional career of an individual is key and is a direct result of their knowledge level and skills used in the profession, as well as the ability to adapt when faced with new professional challenges (Saha et al., 2013, p. 19).

In this work, employability is understood as the ability to obtain employment taking into account people individual characteristics and labor market circumstances (McQuaid & Lindsay, 2005, p. 200). Key employability factors and place of competence was shown in Scheme 1.

2. Literature review

Considering the significance of competencies and the impact of personal factors on employability, it is necessary to analyse which of them particularly affect the success of an individual on the labor market.

The analysis based on the LFS data from the fourth quarter of 2010 is one of the studies where the authors consider the factors limiting the employment opportunities of Poles. Taking into account about 44 thousand of observations (almost 24,000 males and over 20,000 females) two logit models were estimated, separately for each gender. Based on the model for the women, it might be concluded that, at the time, the following factors limiting their employment opportunities were most impactful: age below 65, living in a city, living in the Świętokrzyskie or Małopolskie regions, being a daughter, wife, or sister of the main family provider, having an unemployed status in the previous year. In the case of men, the factors that negatively affected the probability of being employed included: age below 65, being married to the main provider for the family, living in the Świętokrzyskie or Zachodniopomorskie regions and living in a city (Śliwicki & Ręklewski, 2013, pp. 41–42).

Another study discusses the subject of employability of young people on the Polish labor market. Using the data from Syriusz^{Std} database for almost 17,000 people, the authors identified the factors influencing their employment likelihood by means of logit model calculations. The results showed that the factors limiting the employability of young people included: lack of professional experience, higher level of education, small number of learned professions and having children (Wojdyło-Preisner & Zawadzki, 2015, pp. 62–64).

A similar study was conducted based on LFS data (Q4 2014). This analysis of over 7,000 observations indicated the determinants of unemployment among young people. The entire surveyed group was professionally active, so not only did it specify the characteristics that increased the likelihood of belonging

to the unemployed population, but it also identified factors limiting employability. The author mentioned, among them: living in regions where young people face numerous challenges (Podkarpackie, Lubelskie), female gender, basic vocational education, and disability (Kaczmarczyk, 2016, p. 111).

Another study concerns the factors limiting employment among the rural population. The analysis covered over 1.7 thousand people who participated in a representative Study of Human Capital in 2013. The results of a logit model indicated that the factors limiting employability among the members of this group included: male gender, aging (each subsequent year of life decreases the likelihood of employability) or lack of professional experience (Kmieć, 2015, pp. 37–38).

In the literature there is a possibility to find studies which shows what kind of competencies are most valued by employers. One of them was carried out in Poland in 2012. It contained 53 companies, mostly medium and bigger (about 70%). Taking into account results of the study it must be said that the most important competences and abilities was: effective communication, foreign language knowledge, willingness to learn new issues, engagement and ability to work in a team (Budnikowski et al., 2012, p. 5).

In another survey conducted in 2014, the expectations of 1,607 employers towards employees were checked. In this study authors focused on key competencies which allow personal development, employment and social integration. They classify abilities to four categories: communication, technical and computer, personal and professional. First group contains skill as: working in a group, establishing and maintaining contacts, knowledge of the mother tongue and knowledge of a foreign language. Next part includes the ability to perform mathematical calculations, office work skills, Computer and Internet skills and knowledge of specialized software. Third group consists of artistic abilities, willingness to learn new thing, creativity and logical thinking and fact analysis. Last group contains delegating and disciplining skills, own work management, punctuality and time management, stress resistance, independence in decision making and ability to use general knowledge (Agrotec, 2014, p. 65, 155–157).

Another, more actual study, which focused on employers' expectations was carried out in 2021. It contained 3646 employers. The results showed that if one wants to get a job in a key position in company should have higher education, about 4 years seniority, and other abilities as: responsibility, time management, own work management, communicativeness, ease of making contacts, willingness to learn new thing, stress resistance, readiness to work unusual hours required by the employer (Górniak et al., 2022, p. 22, 47–48, 51).

Based on the cited analyses, it can be concluded that the authors examining the impact of various characteristics on the likelihood of belonging to the unemployed or working population focused to a large extent on the basic characteristics, such as: gender, age, education, marital status, and place of residence.

However, there are no studies that would reflect the impact of various competencies on the studied subject.

3. Methods

The estimations in this study were made by means of a logit model. The main category to be aware of is probability. Assuming a binary response variable such that:

$$Y = \begin{cases} 1, & \text{employed person} \\ 0, & \text{not employed person} \end{cases} \quad (1)$$

function F in the case of the logit model stands for the distribution function of the logistic distribution and has the following form:

$$p_i = F(x_i'\beta) = \frac{1}{1 + \exp(-x_i'\beta)}. \quad (2)$$

The inverse value of the function F , i.e., the expression:

$$F^{-1}(p_i) = \ln \frac{p_i}{1 - p_i}, \quad (3)$$

was called the logit, which the logit model is derived from. This expression reduces the relationship of the dependent variables with the modeled probability p_i to a linear form. As presented, the logit is the logarithm of the odds ratio of accepting and not accepting the value 1 by the random variable Y . It is also worth adding that it may take values in the range of $(-\infty, +\infty)$ (Waleśiak, 2011, p. 101). For the same probabilities ($p_i=0.5$), the chance will be 1 and the logit will be 0. When $p_i>0.5$, the logit is positive and for $p_i<0.5$, it is negative. Based on the estimates of p_i , the following predictions can be made: $\hat{y}_i = 1$, for $\hat{p}_i > p^*$ and $\hat{y}_i = 0$, for $\hat{p}_i \leq p^*$.

3.1. The characteristics of the tested sample

Data from the Study of Human Capital carried out in 2019 were used for the purposes of the empirical study. The surveyed population included Polish citizens aged 18–69, who lived in the territory of the country. The draw was stratified, proportional to the subregion of the Central Statistical Office, size class of the locality and gender in relation to age (Antosz, 2018, p. 14). Sample was representative. Due to gaps, data used in study covered a total of 2,401 people, including 1,562 (65.1%) who were employed. The exact characteristics derived for the calculations are presented in Table 1. The following were dominating groups in the sample:

- female (55.8%);
- aged 61 and over (22.7%);
- married (64.1%);
- with basic vocational education (30.0%);
- living in the southern region (20.5%).

3.2. Data used to estimate logit model

The obtained data made it possible to identify several personal characteristics and competencies characterizing the studied sample (Table 2), which were used to estimate the logit model. The data were divided into four groups: socio-demographic features, groups of voivodeships, features characterizing the human capital and other competencies. The following elements were specified in the first category: gender, age and marital status. The second category was formed by grouping voivodships taking into account their geographical location. The following factors were considered for the third one: level of education, knowledge of English, knowledge of other foreign languages and valid driving license. The remaining 25 competencies were specified in the last category.

4. Results of the logit model estimation

The logit model was estimated taking into account the need to expand the existing collection of analyses with characteristics proving the qualitative approach to human resources. Factors influencing the employability of the surveyed sample were determined on its basis. The variables presented in Table 2 became the basis for the first estimation, then the elimination of the independent variables was made by means of the stepwise method (*a posteriori*). The assumed significance level was $\alpha=0.1$. The results of the model with significant explanatory variables are presented in Table 3.

Another important issue is verification of the quality of the constructed model. Table 4 presents the forecast of a likelihood of belonging to the employed category. The model is unbalanced, so a point called the Cramer optimal bound value (c) has been established. It was determined based on the actual share of observations in the sample for which $Y=1$. In the estimated model, it was $c=0.65$. The overall accuracy of this model is 76.6%. It is also worth noting that the researcher must deal with two types of errors (Table 5). The first is defined as sensitivity ($n_{11}/(n_{10}+n_{11})$) and the second as specificity ($n_{00}/(n_{01}+n_{00})$). In this model, the sensitivity was 78.4% and the specificity was 73.2%. Based on the accuracy of the model's predictions, it might be noticed that the model reflects the actual data rather well and using it for classification is more accurate than a random method.

In the case of a dichotomous dependent variable, McFadden's R -square coefficient usually assumes low values (Table 5), which is a characteristic feature of models built on the basis of large sets of individual data (Koško & Osińska,

2007, p. 184). According to the result of the likelihood-ratio test ($p=0.000<0.1$), the estimated model is significant. In addition, the Hosmer and Lemeshow test was performed ($p=0.424>0.1$) in order to successfully prove the estimated model's goodness of fit.

The last instrument used is the ROC (*Receiver Operating Characteristic*) curve. This curve is a measure of the performance of the model in relation to the empirical data. The area of the field under the curve can take values in the range of 0.5 to 1. In the case of the former, the model has no predictive power, while in the latter, the prediction is perfect (Gruszczyński, 2012, pp. 91–92). The result for the presented estimated model was 0.84, which clearly indicates a good fit of the model to the empirical data (Chart 1).

The analysis of the initial set of variables (Table 2) indicated that some of the characteristics were statistically insignificant: groups of voivodships, marital status, and knowledge of a foreign language, as well as some other competencies.

Gender turned out to be one of the statistically significant variables. Taking into account the marginal effects of the variable, it should be noted that for women the likelihood of employment decreases by 11.6 percentage points.

Age was also statistically significant. The variant of — 61 and more — was the base variable. It turned out that each of the variants of this variable increases the likelihood of employability, with the age group of 41–50 having an increase of as much as 36.6 percentage points.

In the case of education, the only statistically significant variant was higher education. The likelihood of being employed increased by over 12 percentage points for people with this level of education.

Having a driving license also turned out to be statistically significant and at the same time this variable had a particularly strong impact on the likelihood of employability. The noted increase among the owners of this document was 16.9 percentage points.

Other variables were associated with other competencies. Among them, there were several statistically significant variables which negatively affected employability, namely: lack of information analysis skills and noticeable inability to draw conclusions, knowledge of assembly and repair of machines and technical devices, lack of physical fitness, the ability to coordinate the work of other people, the ability to solve interpersonal conflicts, readiness to travel frequently, and lack of readiness to work unusual hours required by the employer.

Statistically significant variables which increased the likelihood of employability included: knowledge of specialized computer programs, knowledge of machines, tools and technical devices, physical fitness, independent work management skills, readiness to work unusual hours required by the employer.

5. Conclusion and discussion

However, model estimates need to be examined in relation to the economic reality. Thus, it might be concluded that a significant number of the parameters reflected the intuitively perceived dependencies.

In the case of women, their employability might be lower due to performing the role of a housewife and being responsible for the welfare of others. It is worth noting that some employers do discriminate against young women due to the concern that they might become pregnant and require a long break from work. This also results in mothers, who would like to resume their professional activity after a maternity leave, facing prejudice and discrimination.

Furthermore, conclusions might be drawn based on the variable of age. People aged 41 to 50 belong to a group that is usually characterized by extensive years of professional experience. At the same time, this period in their lives is when they attempt to make a transition from a mobile to a non-mobile activity, which from the perspective of the employers might increase the potential stability of their employment. In addition, these people usually have older children and do not need to take care of minors as often.

Based on the estimated model, it should be stated that people with higher education are more likely to be employed than others. Employers often see ambition, the ability to quickly acquire knowledge and readiness for new challenges in such candidates. Currently, job offers for most specialist positions state a higher level of education as one of the main requirements.

One of the variables that strongly affected the likelihood of being employed was having a driving license. In the era of economic conditions forcing the potential employees to prove their increased levels of flexibility and mobility to the employers, such document seems to be a valuable asset. The ability to directly reach a company's branch, customer, and business partner is an important aspect of conducting business.

Taking into account the remaining competencies which negatively affect employability, it should be noted that in the case of some of them the results were puzzling. While it might be difficult to question the impact of the lack of physical fitness, the lack of ability to analyse information and draw conclusions, or the lack of readiness to work unusual hours required by the employer on employability, it is worth considering what could have influenced the results of other features.

Firstly, thorough analysis of why the ability to assemble and repair machines and technical devices negatively affects employability shows that some enterprises outsource these services, therefore the demand for such trained employees might be reduced. At the same time, the model proves that the ability to operate such machines has a positive impact on employability.

Secondly, the ability to coordinate the work of others and resolve interpersonal conflicts are characteristics often associated with managerial positions. Considering the financial expectations of this professional group and the fact that

managerial positions constitute a relatively small number of job offers, it might be claimed that these specialists search for employment over a longer period of time than others, which has a negative impact on their overall employability.

It is also puzzling that willingness to travel frequently reduces the likelihood of being employed. As already mentioned, there are noticeable tendencies to increase flexibility and mobility requirements in the labour market, so it seems that this variable should have a positive impact on the examined subject. Nevertheless, the willingness to travel frequently may give the employer the impression that the employee's mobility is too high, which poses a risk to the perceived stability of their employment.

In the case of competencies positively influencing the likelihood of employability, it should be stated that the model's estimates reflect the conditions which have been observed in the labor market for some time. Namely, the key issue seems to be the ability to operate machines and devices, and specialized computer programs.

As already mentioned, the lack of physical fitness significantly reduces the likelihood of being employed, and good physical condition has an opposite effect. Cross referencing the number of people with disabilities in the labor market with those who struggle with employability because of the lack of physical fitness, it is noticeable that the estimated results reflect the particular situation of this group of people rather well.

The readiness to work unusual hours required by the employer is also a key issue. As already mentioned, the lack of such attitude significantly reduces the likelihood of employability, but an employee who shows their willingness to accept the required conditions will noticeably improve their chance at being employed. This illustrates how essential the employee's flexibility is in relation to the employer's expectations.

Considering the results of this study, it should be noted that they are consistent with other studies. Kmiec (2015, pp. 37–38) showed, that ageing is one of the factors, which limiting employability, what confirms the similarity of the obtained results. Next aspect is a gender. Both Kaczmarczyk (2016, p. 111) and Kmiec (2015, pp. 37–38) indicated that women had more problems when they want to find an employment. In the case of education, the literature shows that both a high level of education (Wojdyło-Preisner & Zawadzki, 2015, pp. 62–64) and a low level of education (Kaczmarczyk, 2016, p. 111) can be an employment barrier. In this study, it turned out that higher education with a master's degree has a positive effect on the probability of employability.

Taking into account competencies, it should be noted that the results indeed reflect the employers' expectations. One of the key competences in the course of this study was the ability to use a computer and own work management. These needs were also indicated by employers (Agrotec, 2014, pp. 71–72, 75). Similar, both the previous research on employers' expectations (Górniak et al., 2022, p. 22, 47–48, 51) and the conducted estimation lead to the conclusion

that the availability of employees is also an important issue. Employers want the employee to be available during the hours they specify.

In subsequent studies, it would be worth trying to determine what characteristics and competencies of employees will affect their high earnings.

References

- Agrotec. (2014). *Analiza kwalifikacji i kompetencji kluczowych dla zwiększenia szans absolwentów na rynku pracy*. Retrieved 14.06.2023 from https://www.ewaluacja.gov.pl/media/25587/rzl_281.pdf.
- Antosz, P. (2018). *Metodologia badania: bilans kapitału ludzkiego 2016–2023*. Retrieved 14.06.2023 from https://www.parp.gov.pl/storage/publications/pdf/BKL_32_Raport_metodologiczny_PL_2020_04_02.pdf.
- Budnikowski, A., Dabrowski, D., Gąsior, U., & Macioł, S. (2012). Pracodawcy o poszukiwanych kompetencjach i kwalifikacjach absolwentów uczelni: wyniki badania. *E-mentor*, 4(46). 4–17.
- Górniak, J., Kocór, M., Prokopowicz, P., & Szczucka, A. (2022). *Bilans kapitału ludzkiego 2022/2021: raport z badania pracodawców: powrót do rzeczywistości: drugi rok pandemii oczami polskich firm*. Retrieved 14.06.2023 from https://power.parp.gov.pl/storage/publications/pdf/13-BKL-WCAG_15122022.pdf.
- Gruszczyński, M. (2012). Modele zmiennych jakościowych dwumianowych. In M. Gruszczyński (Ed.), *Mikroekonometria: modele i metody analizy danych indywidualnych* (pp. 71–122). Wolters Kluwer.
- Kaczmarczyk, K. (2016). *Bierność i bezrobocie młodzieży w Polsce*. Uniwersytet Mikołaja Kopernika w Toruniu.
- Kmieć, D. (2015). Zastosowanie modelu logitowego do analizy czynników wpływających na bezrobocie wśród ludności wiejskiej. *Zeszyty Naukowe SGGW: Ekonomika i Organizacja Gospodarki Żywnościowej*, 110, 33–42. <https://doi.org/10.22630/eioz.2015.110.18>.
- Kośko, M., & Osińska, M. (2007). Uogólniona metoda najmniejszych kwadratów i modele zmiennych jakościowych. In M. Kośko, M. Osińska, & J. Stempińska (Eds.), *Ekonometria współczesna* (pp. 161–194). TNOiK.
- Kufel, T. (2011). *Ekonometria: rozwiązywanie problemów z wykorzystaniem programu Gretl*. PWN.
- McQuaid, R.W., & Lindsay, C. (2005). The concept of employability. *Urban Studies*, 42(2), 197–219. <https://doi.org/10.1080/0042098042000316100>.
- PARP. (2022). *Bilans kapitału ludzkiego*. Retrieved 02.02.2023 from <https://www.parp.gov.pl/component/site/site/bilans-kapitalu-ludzkiego>.
- Römgens, I., Scoupe, R., & Beusaert, S. (2020) Unraveling the concept of employability, bringing together research on employability in higher education and the workplace. *Studies in Higher Education*, 45(12), 2588–2603. <https://doi.org/10.1080/03075079.2019.1623770>.

- Saha, N., van der Heijden, B.I.J.M., & Gregar, A. (2013). Strategy and policy in mobilizing resources for employability enhancement (West Bengal, India). *International Journal of Education and Information Technologies*, 1(7), 18–26.
- Śliwicki, D., & Ręklewski, M. (2013). Ekonometryczna analiza czynników aktywności zawodowej kobiet i mężczyzn. *Wiadomości Statystyczne. The Polish Statistician*, 58(4), 35–46.
- Walesiak, M. (2011). Modelowanie i prognozowanie zmiennych dwumianowych. In E. Gatnar, & M. Walesiak (Eds.), *Analiza danych jakościowych i symbolicznych z wykorzystaniem programu R* (pp. 99–111). C.H. Beck.
- Wiśniewska, S. (2015a). Development of employee competencies as a determinant of employability in the modern labor market. *Zarządzanie Zasobami Ludzkimi*, 6(107), 131–143.
- Wiśniewska, S. (2015b). Zatrudnialność: pojęcie, wymiary, determinanty. *Edukacja Ekonomistów i Menedżerów*, 35(1), 11–24. <https://doi.org/10.5604/01.3001.0009.4583>.
- Wojdyło-Preisner, M., & Zawadzki, K. (2015). Bariery zatrudnialności osób młodych w Polsce. *Edukacja Ekonomistów i Menedżerów*, 35(1), 55–73. <https://doi.org/10.5604/01.3001.0009.4585>.
- Yorke, M., & Knight, P.T. (2006). *Embedding employability into the curriculum: learning & employability series*. Retrieved 14.06.2023 from <https://www.qualityresearchinternational.com/esecttools/esectpubs/Embedding%20employability%20into%20the%20curriculum.pdf>.

Acknowledgements

Author contributions: author has given an approval to the final version of the article.

Funding: this research was fully funded by the author.

Appendix

Table 1.
Structure of the tested sample

	Specification	in total	in %		Specification	in total	in %
gender	woman	1340	55.8	education	higher education	629	26.2
	man	1061	44.2		post-secondary or secondary vocational education	653	27.2
age	18–24	217	9.0		secondary education	255	10.6
	25–30	227	9.5		basic vocational education	720	30.0
	31–40	444	18.5		lower secondary education and below	144	6.0
	41–50	469	19.5	voivodeship	northern region	367	15.3
	51–60	499	20.8		central region	293	12.2
	61 and more	545	22.7		masovian region	287	12
marital status	single	583	24.3		northwest region	349	14.5
	married	1540	64.1		southern region	493	20.5
	widow/widower	146	6.1		southwest region	187	7.8
	divorced or in separation	132	5.5		eastern region	425	17.7

Source: Own preparation based on PARP (2022).

Table 2.
A set of explanatory variables used to estimate the logit model

Socio-demographic characteristics			
gender (gender*)		age	
1 — woman	0 — man**	a1*	18–24
marital status		a2*	25–30
ms1**	single	a3*	31–40
ms2*	married	a4*	41–50
ms3*	widow/widower	a5*	51–60
ms4*	divorced or in separation	a6**	61 and more
Groups of voivodeship			
NR* (voivodeship: pomorskie, kujawsko-pomorskie, warmińsko-mazurskie)	northern region	SR* (voivodeship: śląskie, małopolskie)	southern region
NWR* (voivodeship: zachodniopomorskie, wielkopolskie, lubuskie)	northwest region	SWR* (voivodeship: dolnośląskie, opolskie)	southwest region
CR* (voivodeship: łódzkie, świętokrzyskie)	central region	MR** (voivodeship mazowieckie)	masovian region
ER* (voivodeship: podlaskie, lubelskie, podkarpackie)	eastern region		

Characteristics of human capital					
education			knowledge of foreign languages		
lse**	lower secondary education and below		knowledge of the English language (ENG*)		
se*	secondary education		1 — yes	0 — no**	
bve*	basic vocational education		knowledge of other foreign languages (OTHER*)		
ts*	technical school		1 — yes	0 — no**	
sve*	secondary vocational education		driving license (drilic)		
he*	higher education		1 — yes	0 — no**	
Other competences					
information analysis and drawing conclusion			time management and punctuality		
k1_ no *	k1_ medium**	k1_ yes *	k14_ no*	k14_ medium**	k14_ yes*
learning new things			independent organization of work		
k2_ no *	k2_ medium**	k2_ yes *	k15_ no*	k15_ medium**	k15_ yes *
using a computer, tablet, smartphone			group work		
k3_ no *	k3_ medium**	k3_ yes *	k16_ no *	k16_ medium**	k16_ yes *
knowledge of specialized computer programs			establishing contacts with people		
k4_ no *	k4_ medium**	k4_ yes *	k17_ no *	k17_ medium**	k17_ yes *
knowledge of machines, tools, and technical devices			being communicative and expressing thoughts clearly		
k5_ no *	k5_ medium**	k5_ yes *	k18_ no *	k18_ medium**	k18_ yes *
assembly and service of machines and technical devices			cooperating with people of different nationalities		
k6_ no*	k6_ medium**	k6_ yes*	k19_ no *	k19_ medium**	k19_ yes*
knowledge of basic calculations			administrative work and record — keeping		
k7_ no*	k7_ medium**	k7_ yes*	k20_ no *	k20_ medium**	k20_ yes*
performing advanced mathematical calculations			coordinating the work of other employees		
k8_ no*	k8_ medium**	k8_ yes*	k21_ no *	k21_ medium**	k21_ yes*
artistic abilities			resolving conflicts		
k9_ no*	k9_ medium**	k9_ yes*	k22_ no *	k22_ medium**	k22_ yes*
physical fitness			fluent in spoken and written Polish		
k10_ no*	k10_ medium**	k10_ yes*	k23_ no *	k23_ medium**	k23_ yes*
overcoming stressful situations			willingness to travel frequently		
k11_ no*	k11_ medium**	k11_ yes*	k24_ no *	k24_ medium**	k24_ yes*
willingness to take responsibility for the performance of tasks			readiness to work unusual hours required by the employer		
k12_ no*	k12_ medium**	k12_ yes*	k25_ no *	k25_ medium**	k25_ yes*
ingenuity, creativity					
k13_ no*	k13_ medium**	k13_ yes*			

Notes:

* indication of the variable in the model; ** base variable.

Source: Own preparation based on PARP (2022).

**Table 3.****Results of the estimation of the logit model parameters of employability of people over 18 in Poland**

Variable	Coefficient	Standard error	Wald chi-square	p-value	Marginal effect	Odds ratio
const.	-1.2220	0.2125	33.0710	<.0001***	–	–
gender	-0.5540	0.1283	18.6420	<.0001***	-0.115558	0.575
a1	0.7246	0.1944	13.8898	0.0002***	0.134025	2.064
a2	1.5466	0.2077	55.4571	<.0001***	0.239199	4.695
a3	1.8203	0.1736	109.8914	<.0001***	0.290060	6.174
a4	2.5564	0.1827	195.7245	<.0001***	0.366491	12.890
a5	1.9329	0.1610	144.0958	<.0001***	0.309356	6.910
he	0.6133	0.1467	17.4842	<.0001***	0.121878	1.847
kl_no	-0.3880	0.2027	3.6633	0.0556*	-0.0867483	0.678
k4_yes	0.2764	0.1513	3.3377	0.0677*	0.0567434	1.318
k5_yes	0.4184	0.1424	8.6353	0.0033***	0.0867975	1.520
k6_yes	-0.3000	0.1678	3.1963	0.0738*	-0.0654931	0.741
kl0_no	-0.7387	0.1699	18.8971	<.0001***	-0.169629	0.478
kl0_yes	0.2151	0.1221	3.1032	0.0781*	0.0454298	1.240
kl5_yes	0.3929	0.1358	8.3673	0.0038***	0.0859683	1.481
k21_yes	-0.3742	0.1462	6.5534	0.0105**	-0.0824505	0.688
k22_yes	-0.3542	0.1205	8.6421	0.0033***	-0.0757625	0.702
k24_yes	-0.2834	0.1296	4.7806	0.0288**	-0.0612373	0.753
k25_no	-0.6328	0.1375	21.1662	<.0001***	-0.140525	0.531
k25_yes	0.5464	0.1349	16.4126	<.0001***	0.113103	1.727
drilic	0.7981	0.1233	41.8833	<.0001***	0.169168	2.221

Note:

Significance level: *** $\alpha=0.01$; ** $\alpha=0.05$; * $\alpha=0.10$.

Source: Own preparation based on PARP (2022).

Table 4.**Forecast of the likelihood of belonging to the employed category in Poland**

	c=0.65	Predicted		Total
		0	1	
empirical	0	614 (n_{00})	225 (n_{01})	839
	1	337 (n_{10})	1225 (n_{11})	1562
total	951	1450	2401	

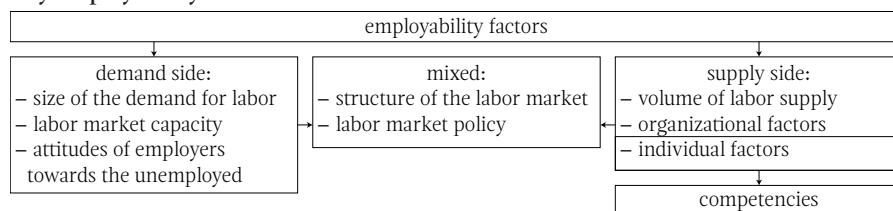
Source: Own preparation based on Kufel (2011).

Table 5.
The analysis of the logit model goodness of fit

Specification	Model
McFadden R-square	0.3165
corrected R-square	0.2800
likelihood ratio test	913.5658
log-likelihood	-1096.8990
accuracy (total)	76.6000
sensitivity	78.4000
specificity	73.2000
false positive	15.5000
false negative	35.4000
odds ratio	9.92000

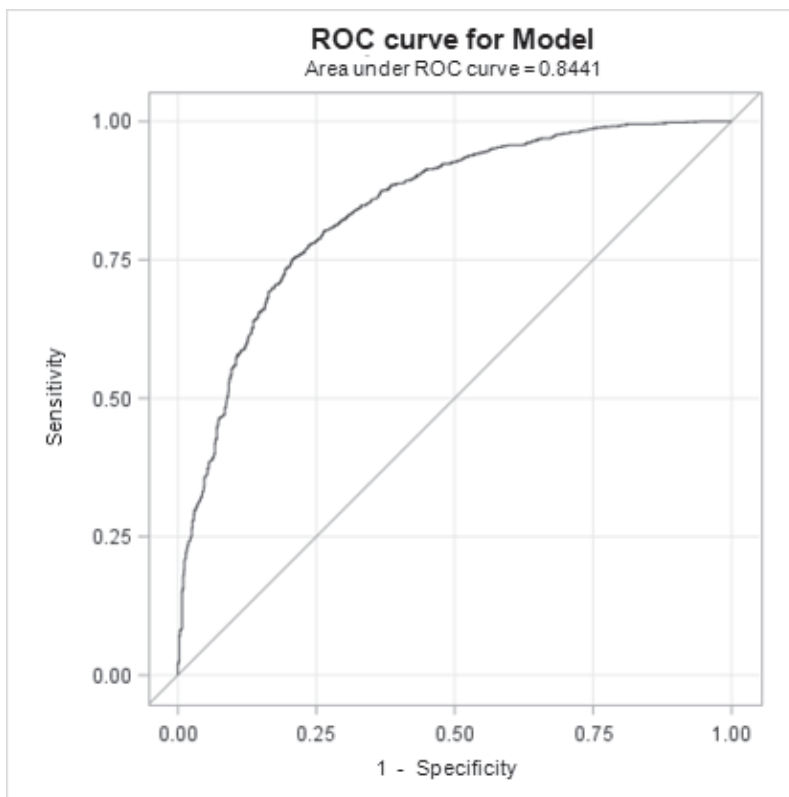
Source: Own preparation based on PARP (2022).

Scheme 1.
Key employability factors



Source: Wiśniewska (2015a, p. 134).

Chart 1.
ROC curve for model



Source: Own preparation.