

Strategies of Croatian manufacturing companies in scarce workforce environment

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submitted by

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Affidavit

I, IGOR NOVAK, MAG. ING. MECH,

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Vienna, 24.09.2018

Signature

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Abstract

The unemployment rate in Croatia in December 2017 was equal to 12.2 % (Croatian Bureau of Statistics, 2018). However, problems with finding workers in Croatia have been increasingly reported by employers and the media in the last few years.

There are many factors contributing to the labour shortages in Croatia: shrinking and ageing population, net emigration, locational and skill gaps and increased demand for labour in recent years. Addressing labour shortages is a key managerial challenge that must consider the unique characteristics of an organisation's labour market. This study explores the cultural and social characteristics of the Croatian labour market that impact the selection of workforce management strategies, with the central research questions:

How do Croatian manufacturing companies address the challenges of workforce shortage?

What workforce management strategies are most effective in the Croatian context?

In answering the central research questions, a mixed-method approach was used, which included interviews with managers and a survey of Croatian manufacturing companies. The gathered data identifies their point of view on the following topics: causes, consequences and assumptions about future trends of labour shortages. Furthermore, frequency of use and success of different strategies is evaluated. The suggested strategies can, to some extent, be applied in other industries and other countries. The interviewed employers have also suggested many ways in which the Croatian government could help them deal with labour shortages.

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Index of abbreviations

Abb.	Full name / meaning	Original name (Croatian)
CBS	Croatian Bureau of Statistics	Državni zavod za statistiku
CES	Croatian Employment Service	Hrvatski zavod za zapošljavanje
CNC	Computer numerical control	
EC	European Commission	
EU	European Union	
GDP	Gross Domestic Product	
HPWS	High Performance Work System	
ILO	International Labour Organization	
ISCO	International Standard Classification of Occupations	
ISO	International organization for standardization	
JMO	Unique education model	Jedinstveni model obrazovanja
LFS	Labour Force Survey	
NKZ	National classification of occupations	Nacionalna klasifikacija zanimanja
NN	Official Croatian newspaper	Narodne Novine
OECD	Organisation for Economic Co-operation and Development	
VAT	Value Added Tax	

Executive Summary

According to the Croatian Bureau of Statistics (2018), the unemployment rate for December 2017 equals 12.2 %. However, more and more reports on labour shortages are seen in the media and indicated by employers.

Labour shortages exist where the “demand for workers for a particular occupation is greater than the supply of workers who are qualified, available and willing to work under existing market conditions” (Shah & Burke, 2003: 7).

The thesis deals with labour shortages in the Croatian manufacturing sector from an employers’ point of view and answers central research questions:

How do Croatian manufacturing companies address the challenges of workforce shortage?

What workforce management strategies are most effective in the Croatian context?

A theoretical background concerning causes and consequences of labour shortages is given. Labour shortages are caused by either a reduced supply of labour or an increased demand for labour. The factors affecting them are therefore divided in two groups: supply-side factors and demand-side factors. There are many factors contributing to the labour shortages in Croatia: shrinking and ageing population, net emigration, locational and skill gaps and increased demand for labour in recent years. European Commission report (2013: 3) states that „shortages are accentuated by the fact that few applicants in Croatia are willing to move to the regions where work is demanded”. Applicant-per-vacancy ratio in different parts of Croatia for manufacturing jobs is given.

Consequences for individuals, companies, and Croatian society at large are explained.

Croatia has one of the lowest employment rates in the European Union, with a lot of inactive population. If the government and companies could encourage inactive population to join the labour market, it could be a great approach for solving labour shortage at state level. Government and employers should also work together to increase the perception of attractiveness of manufacturing jobs in the public eye in order to increase the workforce inflow.

To better understand the context, the Croatian social and educational systems are explained. Eurofound (2017: 30) reports: “In Croatia an important issue is an insufficient link between the education arena, the economy and employers; not enough attention is given to the estimates of future trends and needs of the labour force.” This is consistent with employers’ reports.

Based on the examined literature, 15 different strategies for addressing workforce shortages have been identified, explained, and divided into three groups:

Increasing supply of labour and skills

1. Increased recruiting efforts
2. Reduced minimum qualifications for the job
3. Systematically improving working conditions to retain and attract employees
4. Encouraging engagement of current employees
5. Training of workers
6. Employing retired people
7. Offering one-time employment bonuses
8. Paying recruitment bonuses to employees who bring in new workers
9. Raising wages

Lowering demand for labour and skills

10. Improving processes
11. Reorganizing processes to a point where unskilled labour can be employed
12. Substituting Labour with Machinery and Equipment (automation and digitalization)

Transferring demand for labour and skills to other parties

13. Using temporary agency workers
14. Using cooperating partners, independent contractors
15. Using crowdwork.

Based on interviews and the survey conducted among 32 Croatian manufacturing companies, 4 additional strategies were identified: opening additional plants in locations with better workforce environment, mergers and acquisitions, regular recruiting at colleges or vocational schools and offering scholarships to students.

The advantages and disadvantages of each strategy are explained. The choice of strategy will depend on the size of the enterprise, the estimated length of the shortage, the position in question, the industry, urgency and other strategic goals of the company. Among the interviewed sample of 32 manufacturing companies in Croatia, the most common strategies are: increasing recruiting efforts, improving working conditions and improving the image of the company as an employer. However, strategies seen as the most successful are: employing retired people, offering scholarships to students, opening plants in locations with more workforce and using subcontractors. The most common and successful strategies are substituting labour with machines and equipment and using subcontractors, while the least successful strategies include: raising wages and reducing the minimum qualifications for the job.

Employers have suggested a number of approaches which can be done to prevent, cure, or ease the effects of labour shortages:

- reduction of contributions and taxation of salaries,
- adjustment of quota for high school enrolment for professions in short supply,
- improvement of working environment and the public image of craft trades,
- encouraging collaboration between employers and educational institutions,
- supporting training of the unemployed population,
- adjusting high school curriculum to needs of the labour market,
- providing scholarships to students studying for deficit professions,
- securing better pension incomes and
- supporting and encouraging worker mobility within the country.

Whether the suggested approaches would indeed help to address labour shortages remains to be investigated.

1. Introduction

Since Croatia entered the European Union (EU) on 1st of July 2013, the country has experienced high growth in manufacturing and tourism sectors on the one hand and emigration of workers to wealthier countries on the other (Croatian Bureau of Statistics, 2017). These two factors have put a lot of pressure on the Croatian labour market. Reduced supply and a greater demand for skilled workers has resulted in labour shortage becoming one of the largest constraints for further economic growth.

Problems with finding enough workers have been increasingly reported by Croatian employers and media, although the state statistics show a somewhat different picture. According to the Croatian Bureau of Statistics (2018), the unemployment rate for December 2017 is 12.2 %. In February 2018, there were 193,000 people seeking employment via governmental institutions, as reported by the Croatian employment service central office (2018).

This discrepancy between available workers and job vacancies is in accordance with the EU conclusions from EMPL Committee (2015), reporting that there are locational and skill gaps, rather than a quantitative shortage of workers in the EU. Croatia seems to be no exception. Regardless of whether the problem of labour shortage is factual or only perceived, employers need to have an effective strategy to address it. Since companies (private employers) are normally the first to react to labour shortages (Sirkin et al., 2013) this thesis answers the central research questions:

How do Croatian manufacturing companies address the challenges of workforce shortage?

What workforce management strategies are most effective in the Croatian context?

In order to answer the central research questions, literature on former workforce shortages will be examined in the second chapter, to explain their causes and consequences. Current demographical and labour market data will be analysed and the context of Croatia in terms of education and pension system will be included.

In the third chapter, based on the literature, 15 potential strategies for tackling workforce shortages are identified, explained and classified.

The fourth chapter presents the method used to carry out this study. The findings are presented in chapter five. Finally, chapter six discusses these findings in the light of the prevailing literature.

2. Labour shortages

The terms workforce shortage, lack of workforce, labour shortage and workforce scarcity are generally used interchangeably and refer to the definition used by Barnow et al. (2010: 2):

“A market disequilibrium between supply and demand in which the quantity of workers demanded exceeds the supply available and willing to work at a particular wage and working conditions at a particular place and point in time. “

This is however a simplified definition which does not take into account the available skillsets of the workers. Mullaney et al. (2016) argue that workforce scarcity does not necessarily mean an absolute lack of workers, but rather a lack of workers with the right skills and abilities, on the right location.

Shah and Burke (2003: 7) define labour shortage as a gap where “demand for workers for a particular occupation is greater than the supply of workers who are qualified, available and willing to work under existing market conditions”, and this definition will be used in this thesis, particularly because it describes how companies see labour shortage on a microeconomic level.

The terms skill shortage, skill gaps and skill mismatches define a condition of labour shortage where there are quantitatively enough workers in a country, but there is a gap between the skills they offer and the skills demanded by companies. As previously stated, this is the case for both Croatia and the whole European Union.

According to Barnow et al. (2010), labour shortages have 4 dimensions which describe them:

1. Longevity (how long they last)
2. Severity (size of the gap, number of vacancies)
3. Geographic scope of the shortage
4. Sub-specialty (which jobs or groups of jobs are affected)

Additionally, Richardson (2007) indicates that the key empirical indicator for existence of labour shortages is the time required to fill the vacancies.

In the next chapters, general causes and consequences of labour shortages will be explained and connected with the current situation in Croatia. It will be shown that there are many factors contributing to labour shortages in Croatia: shrinking and ageing population, net emigration, locational and skill gaps and increased demand for labour in recent years.

2.1. Causes of labour shortages

According to Ranasinghe et al. (2016) labour shortage refers to a gap between labour demand and labour supply at current wage levels. Causes of labour shortages are therefore divided into supply side and demand side factors. Ranasinghe et al. (2016) and Ghosh (2005) identify a number of supply factors including:

- Demographics (age structure of the population).
- Net immigration.
- Educational policies.
- Individual education decisions and job preferences.
- Change in regulations (entry barriers to certain professions).
- Social security policies (unemployment benefits, retirement age).
- Geographic distribution of workers and skills.
- Domestic mobility.

Demand side factors are:

- Business cycles and economic growth.
- Demand for products / services.
- Changes in technology or work organization.
- Geographic distribution of companies where workers and skills are needed.

Labour shortages are caused by either reduced supply of labour, increased demand for labour, or both. In the next chapters, most important factors will be discussed and the current situation in Croatia will be explained.

2.1.1. Demographics and employment

Natural increase in population

There are many developed and developing countries, especially in Europe, which experience negative rates of natural increase in population, and Croatia is definitely one of them. As reported by the CIA World Factbook Country Comparison¹, with a birth rate of 8.9 and a death rate of 12.2, Croatia has the 8th lowest natural increase rate in the world (-3.3 per 1000 population), while the total natural increase rate of the European Union equals -0.4 %.

¹ Data obtained on 27th of July 2018 from:
<https://www.cia.gov/library/publications/the-world-factbook/rankorder/2054rank.html>
<https://www.cia.gov/library/publications/the-world-factbook/rankorder/2066rank.html>

Aging of population

Croatia is affected by aging of its population. The age structure of the Croatian workforce according to the 2011 census of population² is indicated in green in Figure 1.

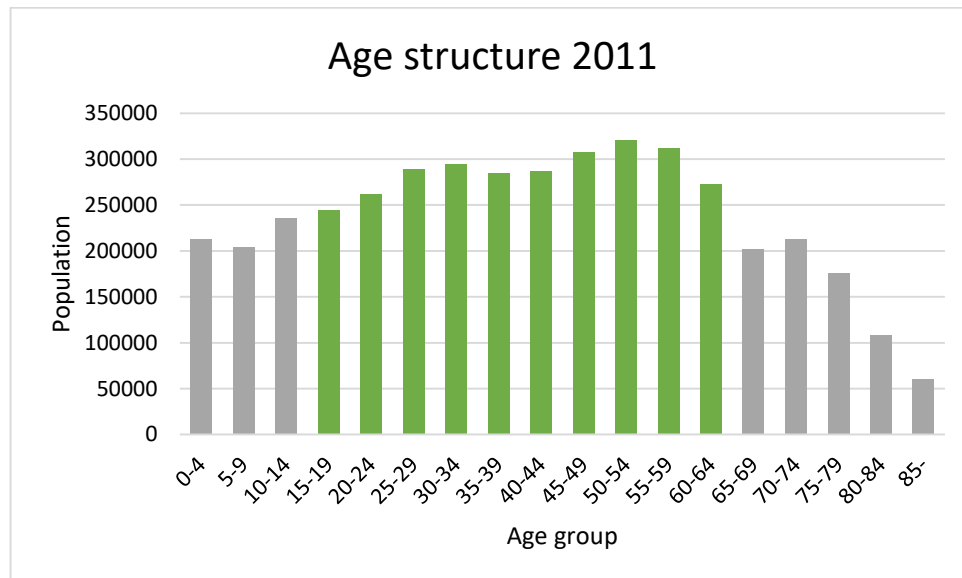


Figure 1. Age structure in Croatia in 2011

In this dataset there was a total of 2,873,828 people aged between 15 and 64. Projections done by the CBS³ show that in 2021 this number will shrink to 2,814,400.

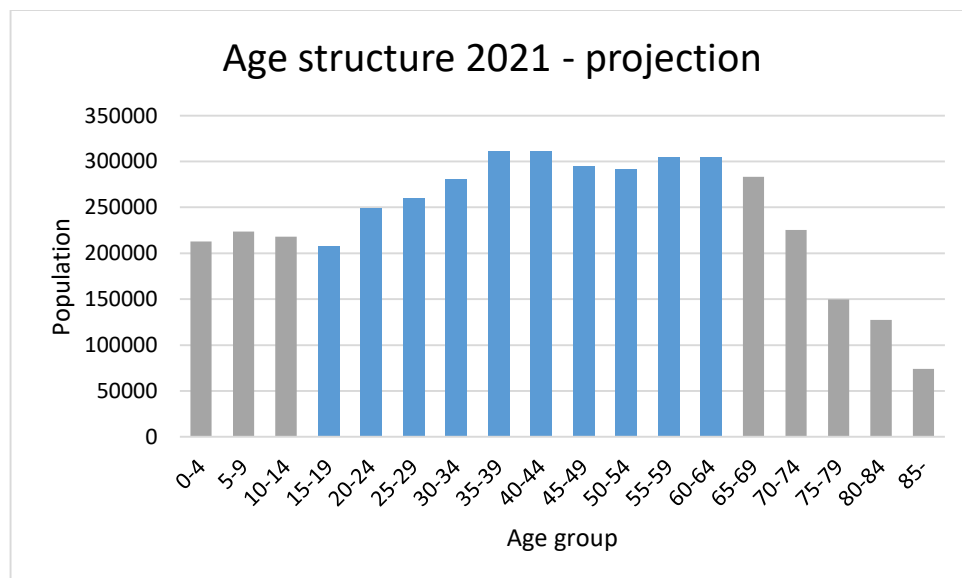


Figure 2. Expected age structure in Croatia 2021

² Croatian bureau of statistics: Census of population 2011, available at: <https://www.dzs.hr/app/rss/piramida-stanovnistva.html>, accessed on 23rd of July 2018

³ Croatian bureau of statistics: Age structure projection for 2021, available at: <https://www.dzs.hr/app/rss/piramida-stanovnistva.html>, accessed on 23rd of July 2018

The projection shown in Figure 2 was done in 2011, when the natural increase rate and especially the net immigration rate were more favourable. In the middle of 2016, the number of people aged 15-64 is estimated at 2,756,774, which is already much lower than the projections about 2021. These figures clearly demonstrate that the working age population in Croatia is declining rapidly.

Employment

The data from the Eurostat Labour Force Survey (2017) identifies that Croatia is one of the countries with the lowest employment rates in European Union. With an employment rate of 63.6 % of working age population, Croatia is well below the average of the EU (71.7 %) and well below the employment rates of neighbouring countries: Slovenia (73.4 %), Hungary (73.3 %) and Austria (75.4 %).

However, the employment rate in Croatia appears to be improving of late (Eurostat Labour Force Survey, 2017) and surpassed Italy (62.3 %) in year 2017.

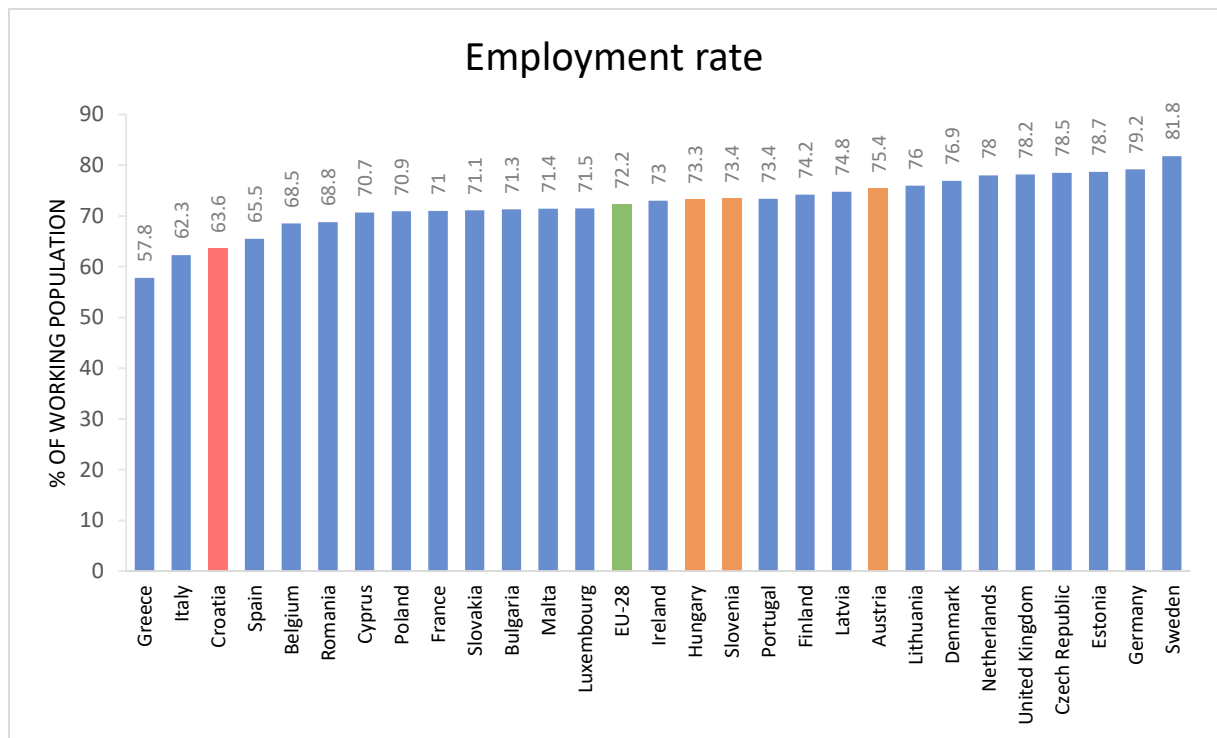


Figure 3. Employment rate among European Union Countries⁴

⁴ Author's representation based on Eurostat LFS, 2017

There is a lot of inactive population, which can be attributed to a number factors, most notably: women aged 24-55 are inactive due to family responsibilities, 49.3 % of men aged 55+ are inactive because of lower retirement ages in the past, and a high number of war-time retirees⁵.

Based on an article from The Ministry of Manpower (Singapore)⁶, a total of 12 reasons for economic inactivity were identified:

1. poor health
2. permanently ill / disabled
3. childcare
4. housework
5. care for elderly or sick relatives
6. retired
7. full time study
8. attending part-time courses
9. lack of necessary qualifications, skills or experience
10. believes no suitable work is available
11. employers' discrimination
12. working in informal economy.

The informal economy in Croatia is quite vibrant and serves as a source of income for many unemployed, as well as for some of the employed. The causes, consequences and governmental policies connected to Croatia's informal economy are discussed by Williams et al. (2017). The authors explain that in order to address undeclared economy, there will be a need to improve the GDP per capita, improve governance, reduce corruption in the public sector, expand labour market interventions to help the most vulnerable groups, increase social expenditure and develop more effective social transfer systems.

Inactivity must not necessarily be considered bad, for example, among young people (15-24) it is normal that a high percentage of them is still in school or at a university. Among other groups, high inactivity can be a sign of an ineffective labour market and data about it can help locate the problem. The inactive people in Croatia show a lot of potential for easing labour shortages, if companies and the government encourage them to join the workforce.

⁵ http://ec.europa.eu/eurostat/statistics-explained/index.php/People_outside_the_labour_market, accessed on 26th of July 2018

⁶ The ministry of Manpower, <http://stats.mom.gov.sg/SL/Pages/Persons-Outside-the-Labour-Force-Concepts-and-Definitions.aspx>, accessed on 26th of July 2018

2.1.2. Net immigration

Net immigration in Croatia is negative which negatively impacts labour supply and contributes to labour shortages.

Since 2014, the number of emigrants has grown tremendously (Figure 4), as a result of Croatia entering the European Union, and many European countries opening their doors to Croatian workers. This implies a reduction in the supply of workers for companies in Croatia. Should the net emigration continue to increase at such a pace, emigration could become the main cause of labour shortages in next few years and cause imbalances on the labour market and in the economy as a whole.

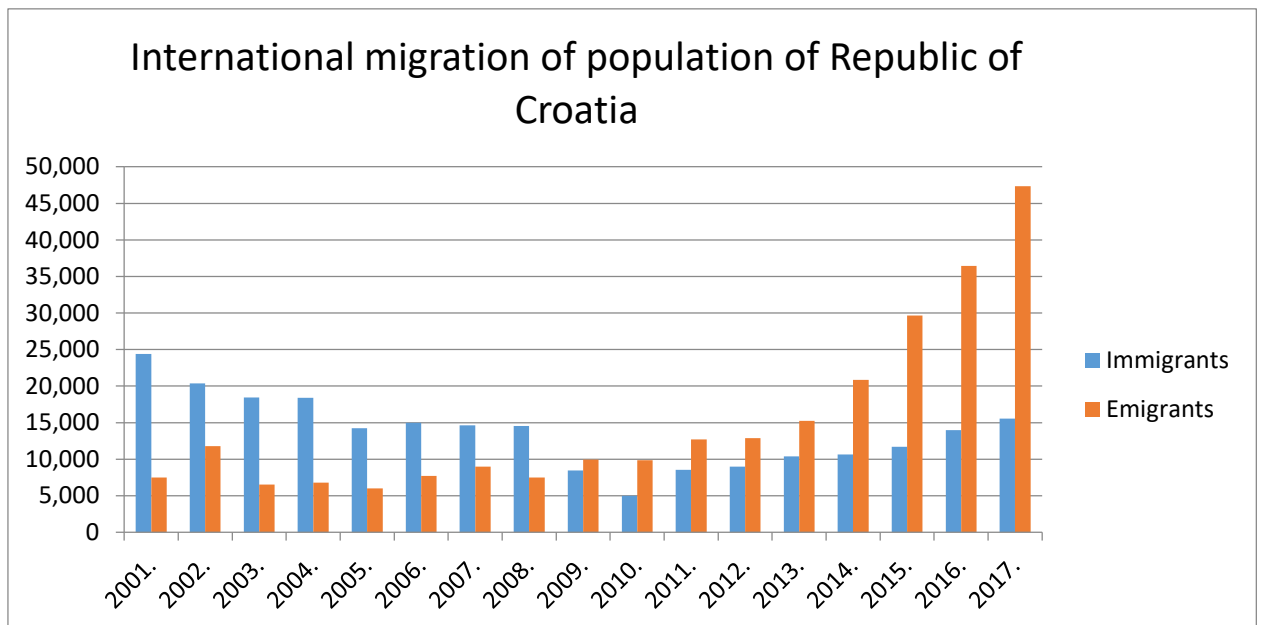


Figure 4. Migration of population in Croatia⁷

The emigration wave in Croatia started about 10 years ago as a consequence of high unemployment, since many citizens had troubles with finding jobs and making a living after the economic crisis of 2008 (Figure 5).

⁷ Author's calculation based on CBS, 2018: Migrations, obtained from https://www.dzs.hr/Hrv_Eng/Pokazatelj/Stanovnistvo%20-%20migracije.xlsx, accessed on 23rd of July 2018

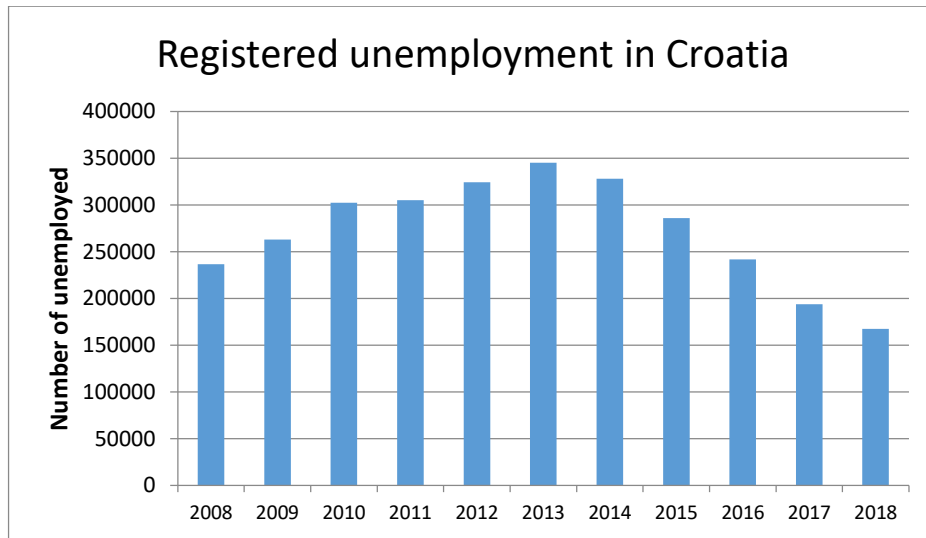


Figure 5. Registered unemployment in Croatia in last 10 years⁸

In the last 2-3 years, however, more jobs have become available. The statistics from the Croatian Employment Service show a considerable increase in employer-reported vacancies, as shown in Figure 6.

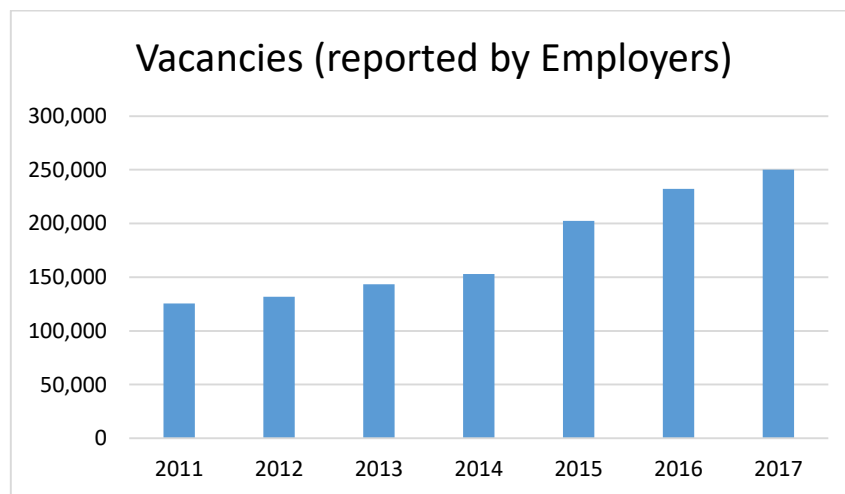


Figure 6. The number of vacancies in Croatia

Therefore, emigration can be, at least to some point, explained as a consequence of individual preferences. For example, the proximity of Slovenia and Austria, where nominal average net wages are 26 % and 171 % higher, respectively, encourages individuals living in the northern parts of Croatia to look for a job in these countries⁹.

⁸ Author's representation based on <http://statistika.hzz.hr/Statistika.aspx?tipIzvjestaja=1>, accessed on 31st of July 2018

⁹ European countries by average wage:

https://en.wikipedia.org/wiki/List_of_European_countries_by_average_wage, accessed on 31st of July 2018

It has to be taken into account, that the reduced unemployment is largely a direct consequence of net emigration (Figure 4).

The importance of emigration among young people can be illustrated through the results of a survey conducted by agency „Promocija plus“¹⁰. According to research done by the agency in February 2018¹¹, youth emigration is indicated as the “hottest political topic in Croatia” among 20.6 % of surveyed citizens. The reasons for emigration were investigated by the Croatian Employers Association¹² on a sample of 661 emigrants in the period between March and May 2018. The countries where most people emigrate to are: Germany, Ireland, Sweden, and Austria. The most common reasons for leaving Croatia are the following:

- Unorganized and poorly run country, incapable politicians and political parties without a vision (8 % of all the answers).
- Lack of hope and optimism among residents, negative assumptions about the future (7.6 %).
- Employing based on personal connections, nepotism, political discrimination (7.4 %).
- Corruption and criminality in the public sector and other layers of society (7.3 %).
- Arguing about Croatian history among politicians, media and individuals (6.4 %).
- Croatia does not offer the future they want for their family and children (6.3 %).

The research indicated that 42 % of the surveyed emigrants do not intend to move back to Croatia. The trend of growing emigration is expected to continue in the future.

Since Croatia has always had troubles with high unemployment, the immigration quotas were traditionally kept low. However, on 2nd of August 2018, the Croatian government responded to increased emigration by increasing the number of work permits for immigrants to a total of 27,479¹³, after being pressured by a large number of employers.

¹⁰ “Promocija plus” is a market research agency which conducts monthly research of the public opinion related to political and economical topics in Croatia.

¹¹ Promocija plus – CRO-demoskop: monthly research for February 2018 https://www.promocija-plus.com/public/cds/cro_demoskop_02_2018.zip, accessed on 31st of July 2018

¹² <https://www.hup.hr/hup-predstavio-rezultate-istrazivanja-medju-iseljenicima-o-razlozima-odlaska.aspx>, accessed on 31st of July 2018

¹³ Data available at: <http://www.poslovnih.hr/hrvatska/vlada-povecala-kvote-za-zaposljavanje-stranac-oglaseno-je-14417-radnih-mjesta-koja-ne-mozemo-popuniti-343530>, accessed on 4th of August 2018

2.1.3. Educational policies and the school system

Ministry of Science and Education¹⁴ divides the Croatian education system into:

1. preschool education,
2. elementary education,
3. secondary education,
4. adult education and
5. higher education.

Preschool education refers to children from 6 months of age until school age. It is performed in kindergartens and preschool institutions and it is obligatory for all children in the last year before starting the elementary education as stated in the Croatian Preschool Education Act¹⁵.

Elementary education starts when a child is 6 or 7 years old and takes 8 years to complete. It is obligatory for all children and it is financed by the Croatian government. Elementary education gives a knowledge and skill basis for further education.

Secondary education in Croatia is also fully financed by the Croatian government, but it is not obligatory. According to the type of the program, secondary schools are divided to:

1. gymnasiums (Grammar schools)
2. vocational or trade schools
3. art schools.

Gymnasium programs prepare students for further education at university level. Upon finishing gymnasium, students do not acquire a specific qualification, unless they finish their education at higher levels (bachelor or master programs).

Art school allows students to develop skills, abilities and creativity in different artistic fields.

Vocational or trade schools mainly teach and train students to enter the labour market, but they also prepare them for higher education. Different programs take between 1 and 5 years to complete. The significance of vocational and trade schools is indicated by the fact that there was 117,384¹⁶ students who attended vocational and trade schools in the school year of 2014/2015, which amounts to 66.9 % of the total number of students that attended secondary

¹⁴ School system in Croatia <https://mzo.hr/en/rubrike/education>, accessed on 30th of July 2018

¹⁵ Preschool Education Act, available at: <https://www.zakon.hr/z/492/Zakon-o-pred%C5%A1kolskom-odgoju-i-obrazovanju>, Article 23.a, accessed on 30th of July 2018

¹⁶ Data available on: https://mzo.hr/sites/default/files/links/hrvatski_obrazovni_sustav.pdf, accessed on 30th of July 2018

school that year. The number of students attending different secondary school programs In different school years is given in Figure 7, based on publications from CBS. Unfortunately, the total number of students is decreasing (as a result of the shrinking and ageing of the population). Even more important for the manufacturing sector, is that the number of students in industrial and crafts schools has decreased by more than 27 % in last 5 years. At the same time there is a relative increase in students going to art schools and gymnasiums.

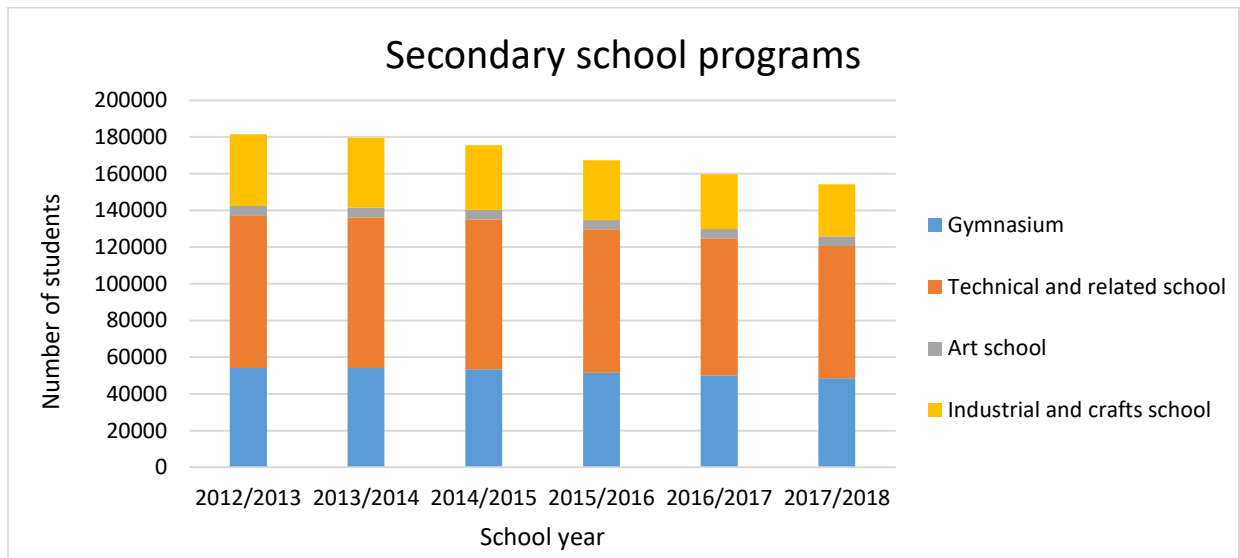


Figure 7. Secondary school students attending different programs¹⁷

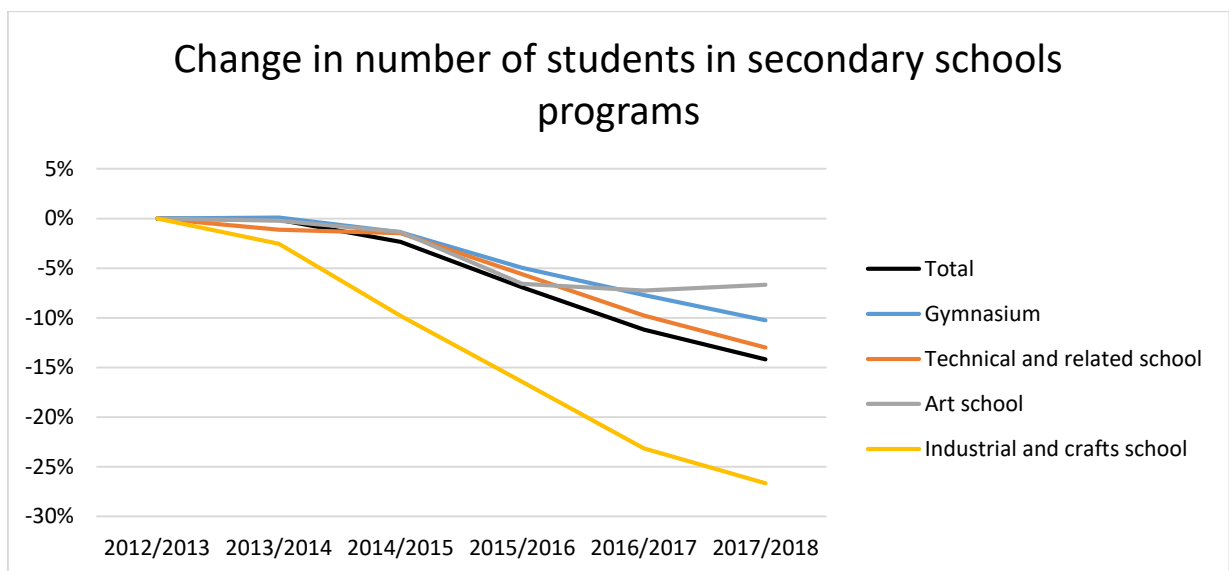


Figure 8. Change in the number of students participating in secondary school programs

¹⁷ Data for the Figure 7 has been taken from the following sources, all accessed on 30th of July 2018:
https://www.dzs.hr/Hrv_Eng/publication/2014/SI-1521.pdf
https://www.dzs.hr/Hrv_Eng/publication/2015/08-01-03_01_2015.htm
https://www.dzs.hr/Hrv_Eng/publication/2016/08-01-03_01_2016.htm
https://www.dzs.hr/Hrv_Eng/publication/2017/08-01-03_01_2017.htm
https://www.dzs.hr/Hrv_Eng/publication/2018/08-01-03_01_2018.htm

In the last 5 years, the number of students in secondary schools has fallen from 181,384 to 155,642, a decrease of 14 %. Only in the school year of 2017/2018, the number of students decreased by 4.2 % compared to the previous school year. A part of it is due to the shrinking population, as less children are born each year, which is illustrated by a decrease in the number of students in elementary schools, as given in Figure 9. Number of students in elementary schools has decreased by 5 % since 2013, while the number of students in secondary schools has decreased by 14 %. This also implies that a lower proportion of students enters secondary education. This can be explained by the increased emigration of families with school-aged children.

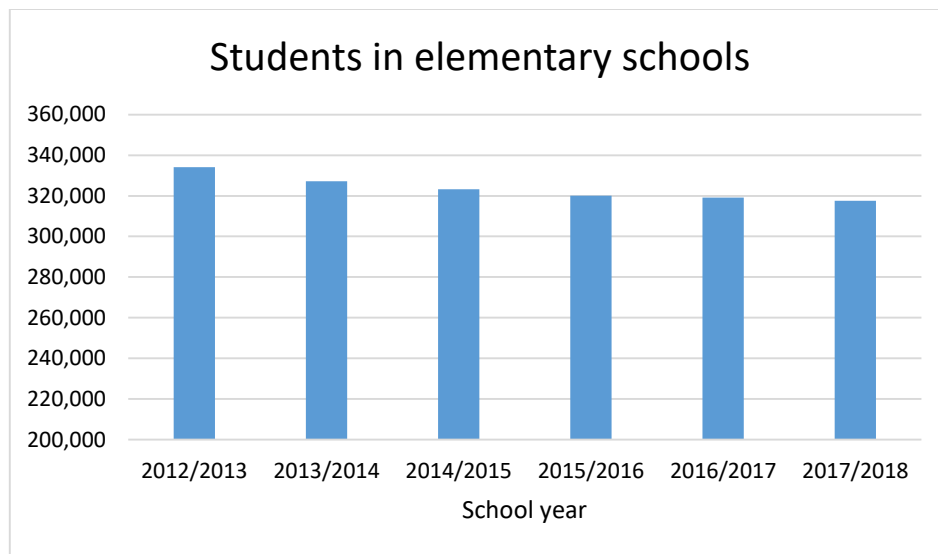


Figure 9. Number of students registered as attending elementary school in Croatia¹⁸

Ministry of Science and Education differentiates between three types of vocational educational programs in Croatia¹⁹:

1. secondary profession degree programs (four or five year programs)
2. basic professional degree programs (3 year programs)
3. qualification and training programs.

Upon graduation from a vocational school, students get a diploma which qualifies them for working in an industry. After working in a given industry for at least three years, the worker can take a master's exam which qualifies them for training of apprentices and having their own craft business.

¹⁸ Author's representation based on: CBS: Education:

https://www.dzs.hr/Hrv_Eng/Pokazatelji/Obrazovanje.XLSX, accessed on 30th of July 2018

¹⁹ Vocational school system: https://mzo.hr/sites/default/files/links/hrvatski_obrazovni_sustav.pdf, accessed on 30th of July 2018

Apprenticeships

The school program in vocational and trade schools consists of theoretical and practical parts.

There are two distinct program groups for vocational schools, the classical approach, and the so called JMO approach (JMO – unique education model – cro. *jedinstveni model obrazovanja*) which includes more hours spent on the practical side of the education, conducted in collaboration with qualified companies. The students have a prescribed set of exercises which they have to master each year of their study. The companies help them learn, provide a monetary compensation, and select the best students to employ upon graduation.

Adult education refers to people older than 15. It also includes retraining of workers who are leaving one profession to pursue a career in other professions.

2.1.4. The pension system and social security policies

There is a number of different types of retirement in Croatia, based on the requirements one has to fulfil in order to gain retirement rights. These types are (Croatian Pension Insurance Institute, 2018):

1. Normal retirement
 - a. Men older than 65, worked and paid contributions for a minimum of 15 years.
 - b. Women older than 62, worked and paid contributions for a minimum of 15 years.
2. Early retirement (pension is reduced)
 - a. Men older than 60, worked and paid contributions for a minimum of 35 years.
 - b. Women older than 57, worked and paid contributions for a minimum of 32 years.
3. Long-term contributor retirement
 - a. Men and women older than 60, worked and paid contributions for a minimum of 41 years.

The laws regarding retirement rights for women have been gradually changing with the goal of being equalized with those for men by 2030. During this transitional period, the retirement age for women is prolonged by 3 months every year. After 2030 retirement age for women and men will be equal, and will further increase by 3 months every year, to reach the age of 67 years in 2038.

There are 3 more types of retirement (for people with disabilities, for families of a deceased person, and special retirements) which are mostly not relevant in terms of the labour market.

When an employee reaches the age of 65, their employment contract ends because they have fulfilled the requirements for retirement. Employers can, but are not obliged to, negotiate with the worker that they remain employed for a specific number of extra months or years.

Retired people, if they choose so, can be employed part-time for up to 20 hours a week, without losing their rights to pension. They can remain working without age limits as there is no mandatory retirement age in Croatia in the private sector. This extends the pool of workers available on the labour market. At the same time, it negatively affects youth unemployment, since some companies prefer employing elderly but experienced workers to young ones.

The ratio between employed and retired people has been improving since year 2014 as illustrated in Figure 10.

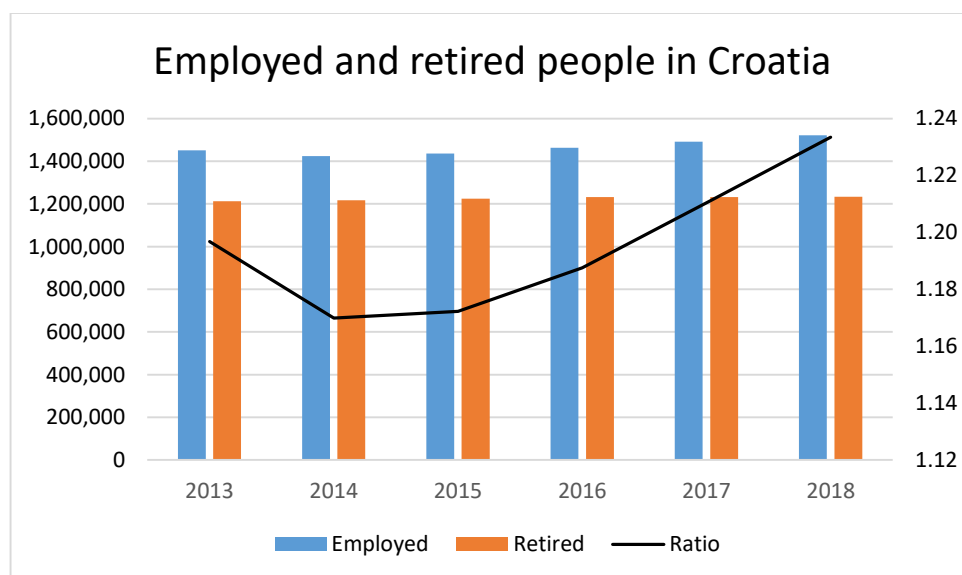


Figure 10. Employed-to-retiree ratio in Croatia²⁰

Unemployment benefits

The rights and obligations of unemployed are defined in the Act on Job Placement and Unemployment Insurance (2017).

The right to unemployment benefits after termination of employment is reserved for the unemployed who:

1. Have worked previously (at least 9 months in the last 24 months).

²⁰ Author's representation based on statistical information of Croatian Pension Insurance Institute: <http://www.mirovinsko.hr/default.aspx?id=723>, accessed on 1st of August 2018

2. Have been fired (rather than resigning).
3. Apply to the Croatian Employment Service and submit a request for monetary compensation within the statutory deadline.

The unemployment benefits are received for a set number of days, between 90 and 450, depending on how long the person in question was employed.

It is important to note that three groups of people are not eligible for unemployment benefits although they are unemployed (Act on Job Placement and Unemployment Insurance, 2017):

1. Young people who do not yet have any work experience (i.e. less than 9 months).
2. Long-term unemployed.
3. People not actively searching for a job or not available for work.

The monthly compensation for the unemployed amounts to 60 % of their last gross salary during an initial period of 90 days, and half of this amount for the remainder of benefit period. Additionally, the monthly unemployment benefit cannot be higher than 70 % of the average monthly salary in Croatia, and cannot be lower than 50 % of the minimum net monthly salary. In 2017, the minimum gross monthly salary amounted to 3,276 kn (442 €). This amount was increased to 3,439.80 kn (464 €) in 2018. Average net salary for 2017 was 5,985 kn (810 €).

Rutkovski (2003) indicates that unemployment benefits in Croatia are modest, cover a rather low percentage of unemployed people and are not likely to have much influence on the level of unemployment in Croatia.

2.1.5. Geographic distribution of workers and skills

Locational gaps

The EC report (2013: 3) states that „shortages are accentuated by the fact that few applicants in Croatia are willing to move to the regions where work is demanded. “

The groups of jobs, according to International Standard Classification of Occupations, for which the ratio is most severe (among skilled manufacturing jobs only) are: 8 *Plant and Machine Operators and Assemblers*, 75 *Food Processing, Woodworking, Garment and Other Craft and Related Trades Workers* and 72 *Metal, Machinery and Related Trades Workers*. This is illustrated in Figure 11. The ISCO-08 standard is directly comparable with the Croatian National Classification of Occupations (NKZ-10, 2010).

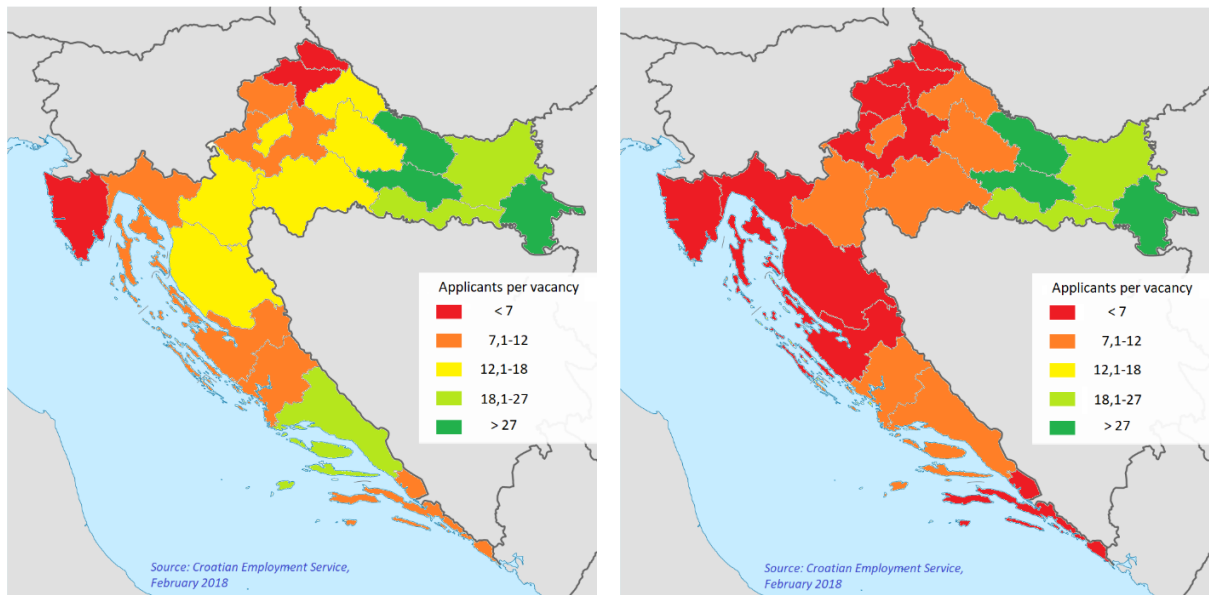


Figure 11. All skilled workers (left) and ISCO-08 groups 8, 75 and 72 (right)

As seen from geographical representation of applicant-to-vacancy ratios, there are big differences between different regions of Croatia. This is why encouraging domestic mobility is a good potential strategy for overcoming labour shortages. The data for Figure 11 is given in Table 1 and Table 2²¹.

Domestic mobility of Croatian workers has increased in last few years, as reported by the Croatian Employment Service. This is illustrated by the fact that during 2017 only 350 people have rejected a job remote from their hometown, but in the same period 32,600 decided to move and take a job in other town, at least temporarily (Gatarić and Lepad Štefančić, 2018).

²¹ Author's own calculations, based on:
http://burzarada.hzz.hr/Posloprimac_RadnaMjesta.aspx, accessed on 18th of February 2018
http://burzarada.hzz.hr/Poslodavac_PregledPonude.aspx, accessed on 18th of February 2018

Table 1. Number of applicants per vacancy – All skilled workers

County	Job applicants	Vacancy	Ratio
<i>Bjelovarsko-bilogorska</i>	555	40	13.9
<i>Brodsko-posavska</i>	1,344	50	26.9
<i>Dubrovačko-neretvanska</i>	466	46	10.1
<i>Grad Zagreb</i>	3,693	253	14.6
<i>Istarska</i>	400	139	2.9
<i>Karlovačka</i>	532	36	14.8
<i>Koprivničko-križevačka</i>	327	27	12.1
<i>Krapinsko-zagorska</i>	438	62	7.1
<i>Ličko-senjska</i>	231	18	12.8
<i>Međimurska</i>	330	94	3.5
<i>Osječko-baranjska</i>	2,906	109	26.7
<i>Požeško-slavonska</i>	576	20	28.8
<i>Primorsko-goranska</i>	1,278	134	9.5
<i>Sisačko-moslavačka</i>	766	61	12.6
<i>Splitsko-dalmatinska</i>	3,760	154	24.4
<i>Šibensko-kninska</i>	766	73	10.5
<i>Varaždinska</i>	495	123	4.0
<i>Virovitičko-podravska</i>	828	14	59.1
<i>Vukovarsko-srijemska</i>	1,700	28	60.7
<i>Zadarska</i>	657	66	10.0
<i>Zagrebačka</i>	1,092	110	9.9
TOTAL	23,140	1,657	14.0

Table 2. Number of applicants per vacancy – ISCO groups 8, 72, 75

County	Job applicants	Vacancy	Ratio
<i>Bjelovarsko-bilogorska</i>	281	31	9.1
<i>Brodsko-posavska</i>	815	32	25.5
<i>Dubrovačko-neretvanska</i>	156	31	5.0
<i>Grad Zagreb</i>	993	129	7.7
<i>Istarska</i>	172	94	1.8
<i>Karlovačka</i>	232	26	8.9
<i>Koprivničko-križevačka</i>	155	14	11.1
<i>Krapinsko-zagorska</i>	165	38	4.3
<i>Ličko-senjska</i>	94	14	6.7
<i>Međimurska</i>	135	63	2.1
<i>Osječko-baranjska</i>	1,629	76	21.4
<i>Požeško-slavonska</i>	297	10	29.7
<i>Primorsko-goranska</i>	376	88	4.3
<i>Sisačko-moslavačka</i>	298	29	10.3
<i>Splitsko-dalmatinska</i>	1,219	108	11.3
<i>Šibensko-kninska</i>	298	42	7.1
<i>Varaždinska</i>	159	90	1.8
<i>Virovitičko-podravska</i>	433	6	72.2
<i>Vukovarsko-srijemska</i>	1,010	16	63.1
<i>Zadarska</i>	274	42	6.5
<i>Zagrebačka</i>	429	70	6.1
TOTAL	9,620	1,049	9.2

It has to be taken into consideration that the real applicant-to-vacancy ratio is even lower than reported in this dataset, because for example if a company wants to hire 30 welders, it opens job postings for only 5 people, and when they fill those 5 vacancies, they open another 5.

For a more detailed analysis of unemployment and vacancies in Croatia see Milas (2016).

2.1.6. Economic growth

Economic growth is one of the main factors affecting the demand for labour. In 2015, two years after Croatia entered the European Union, it experienced continuous growth of GDP by 2.9 % on average, as seen in Figures 12 and 13. In Figure 14 it is shown that GDP from manufacturing has grown by on average 5.0 %. This implies that there is an increased demand for products of the Croatian manufacturing sector, and this increase in outputs indirectly increases demand for workers in the manufacturing industry.

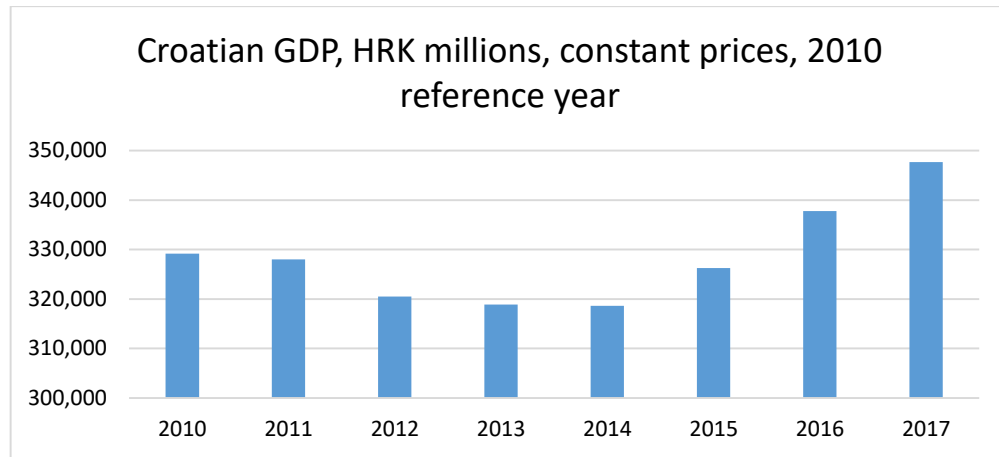


Figure 12. GDP of Croatia²²

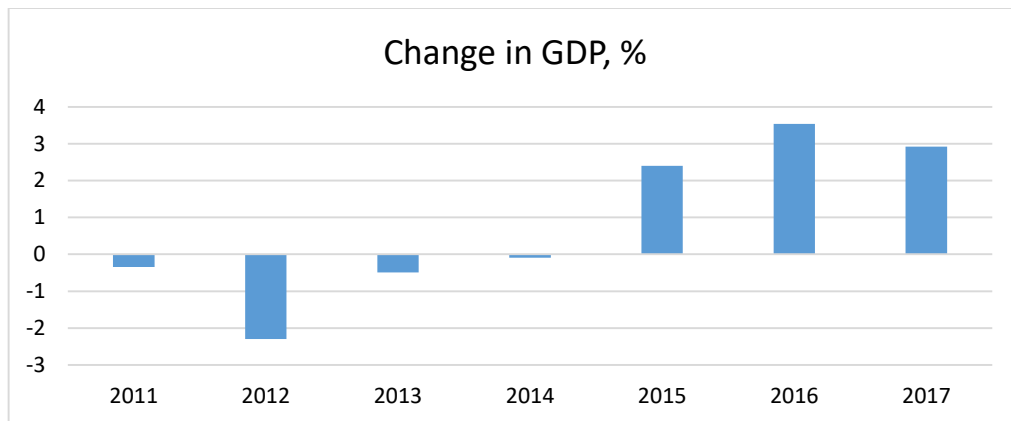


Figure 13. GDP of Croatia – change²³

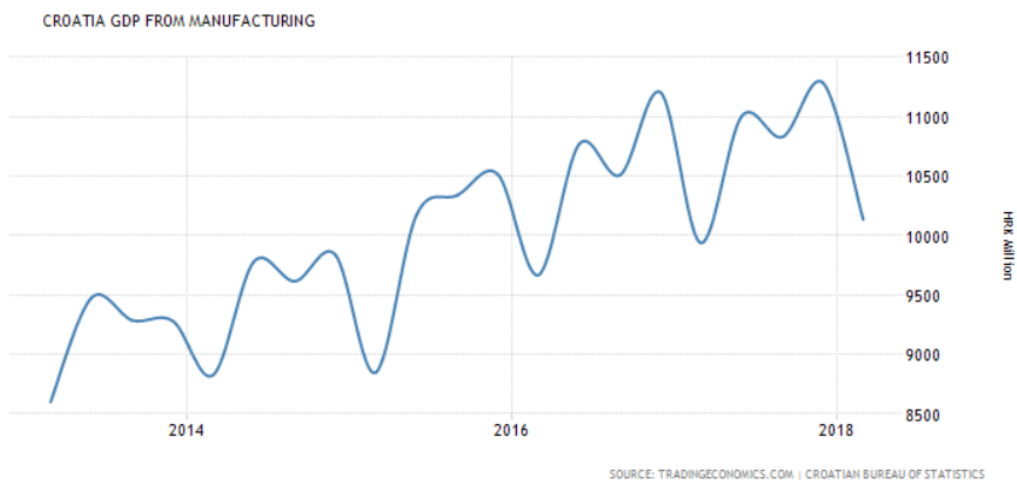


Figure 14. Croatia GDP from manufacturing²⁴

22 Data obtained from Croatian Bureau of Statistics: Gross Domestic Product, accessed on 21st of July 2018 from: https://www.dzs.hr/Hrv_Eng/Pokazatelj/MSI%20BRUTO%20DOMACI%20PROIZVOD.xlsx

23 Authors calculations based on Croatian Bureau of Statistics: Gross Domestic Product, accessed on 21st of July 2018 from: https://www.dzs.hr/Hrv_Eng/Pokazatelj/MSI%20BRUTO%20DOMACI%20PROIZVOD.xlsx

24 Tradingeconomics.com: Croatia – GDP from manufacturing, accessed on 21st of July 2018 from:

2.2. Consequences

Labour shortages, especially if they persist for a longer time, have consequences for individuals, companies, and the society as a whole.

Consequences for individuals

Industries affected by labour shortages report that existing employees are working overtime hours (Barnow et al., 2010). They have to reorganize their time to fill in for vacancies, sometimes doing the work for which they are not qualified or trained (Ranasinghe, 2016). This causes lower productivity, but for the employees it also causes greater stress and can even have safety implications. This leads to a discontent and disengagement of employees, and all further effects connected with it.

On the other side, if companies are not operating at their optimal level, consumers may be denied availability of certain products or services (Barnow et al. 1998)

Consequences affecting companies (Trendle, 2008, Barnow et al. 1998) are: lower quality of production output, lower productivity of workers and machinery, missing out on market opportunities, limited growth, slower wealth creation, imbalances in wage levels, higher turnover and difficulties in maintaining stability of the processes.

For example, a machine which could be operating 24 hours a day, operates only 8 hours because there are no workers available to operate it. Lack of skilled workers also causes a lower quality of products and more scrap. Furthermore, companies are unable to accept market opportunities, caused by the lack of skilled workforce. They are forced to adjust their product portfolio and processes to use unskilled labour. Snower (1994) suggests that this can create a downward spiral because the lack of skilled workers causes a lack of skilled jobs, and a lack of higher-paid skilled jobs causes a lack of incentives for workers to train their skills, thus causing lack of skilled workers. Consequently, the economy settles in a low-skill equilibrium. Market mechanisms cannot pull the economy out of this situation, only an government intervention can.

The most severe but least likely consequence of labour shortage is that it may cause closing of companies.

Consequences affecting whole economy

Labour shortages cause a number of negative consequences for the whole economy. This includes lower economic growth, because resources are not being put to their best use and the economy is not operating at its most efficient point, (Barnow et al., 2010), slower technological progress and increased imports (Barnow et al. 1998). Furthermore, according to Production Engineering (2012), lower employment rate negatively affects the economy of the entire country, leads to a sub optimal growth rate, lower consumption, lower tax income, problems with the pension system and subsequently to feelings of discontent in the population.

The low employment rate in Croatia means that the public budget is low. This is probably also one of the reasons why Croatia, at 25 %, has the second highest VAT tax rate in European Union and one of the highest in the World. This implies that the proportion of the population which pays taxes is additionally burdened in order to compensate for those who are not paying taxes.

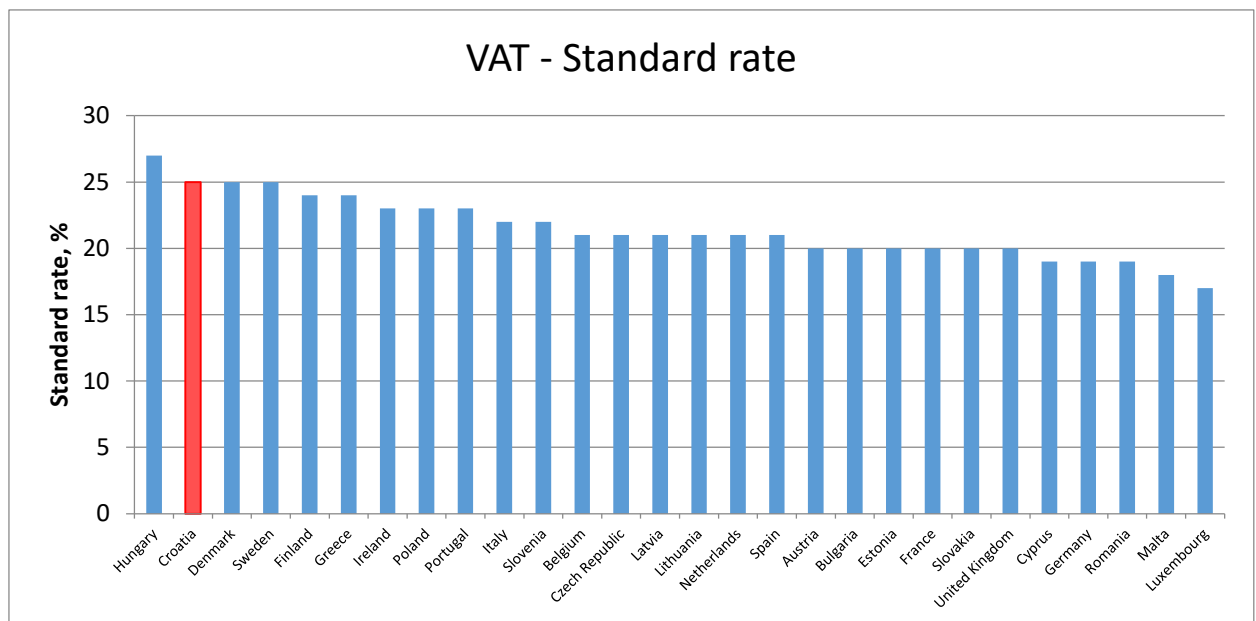


Figure 15. Value added tax among European countries²⁵

Cappelli (2014) raises the question: who should be responsible for training workers' skills, the national education system, companies or the employees themselves? He argues, that employers are silently pushing this responsibility and costs of additional training towards employees. Employees use their free time and money to invest in their skills and knowledge to be able to

²⁵ Author's representation from data available on:
https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/vat/how_vat_works/rates/vat_rates_en.pdf, accessed on 2nd of August 2018

contribute and earn more in the future. This works as long as there are attractive, highly skilled and highly compensated jobs available and sought by employers. If this is not the case and an employee cannot find a better job, they have wasted their training time and money. Cappelli (2014) emphasizes that this financial risk (connected with redundant skills) is completely pushed towards the employee.

However, if the companies were to finance the education of their workers themselves, there would be less need for teachers in the education systems, and a subsequently lower fiscal pressure on companies should be installed.

3. Workforce management strategies

There are different actions which companies conduct in order to address labour shortage problems, the most obvious one being working overtime (Barnow et al., 2010). However, this cannot be relied upon as a long-term solution. Long-term strategies are usually associated with considerable costs, and the benefits they yield are seen in the long run.

To address labour shortages, companies should either increase the supply of labour and skills in their company (e.g. by recruiting) or reduce the demand for labour and skills (automation, digitalization) (Barnow et al., 2010). The third approach is transferring the demand for labour and skills to other parties (customers, suppliers, etc.).

Strategies for addressing the labour shortages will therefore be grouped in three groups: increasing the supply, lowering the demand and transferring the demand for labour and skills.

Increasing the supply of labour and skills

1. Increased recruiting efforts (Barnow et al., 2010, Cappelli, 2014)
2. Reduced minimum qualifications for the job (Barnow et al., 2010, Cappelli, 2014)
3. Systematically improving working conditions to retain and attract employees (Gupta, 2004, Barnow et al., 2010, Cappelli, 2014)
4. Encouraging engagement of current employees (Gupta, 2004)
5. Training of workers (Barnow et al., 2010)
6. Employing retired people (Ganelli & Miake, 2015)
7. Offering one-time employment bonuses (Barnow et al. 2010)
8. Paying recruitment bonuses to employees who bring in new workers (Barnow et al., 2010)
9. Raising wages (Barnow et al., 2010, Cappelli, 2014)

Reducing the demand for labour and skills

10. Improving processes (ISO 9001, 2015)
11. Reorganizing processes to a point where unskilled labour can be employed (Barnow et al., 2010, Cappelli, 2014)
12. Substituting Labour with Machinery and Equipment (automation and digitalization) (Barnow et al., 2010, Cappelli, 2014, Ducanes & Abella, 2008)

Transferring the demand for labour and skills to other parties

13. Using temporary agency workers (Barnow et al., 2010)
14. Using cooperating partners, independent contractors (Barnow et al., 2010)
15. Using crowdwork (Fair Crowd Work, 2018a)

According to Richardson (2007), there are five ways to increase the aggregate supply of skilled labour for a particular occupation: an increase in average hours worked by employees, increase in the proportion of qualified people actually working in their profession, increase in the number of qualified people via training, an increase in the time a professional spends doing things only they can do and an increase in the output per hour worked. There are a many strategies employers can use to apply those principles in tackling the reduced supply of labour in their companies.

The choice of strategy will depend on: the size of the enterprise, its financial background, the estimated length of the shortage (short term, long term), the industry, the position in question, the urgency of requiring workers and other strategic goals of the company.

Some of these strategies are costlier, or less reversible than others (Barnow et al., 2010). Others may have other drawbacks which are initially not directly visible. Some of them can be applied only in a specific context. In the next chapters, a description, advantages and disadvantages of each strategy will be given. These strategies are mainly concerning Croatian manufacturing companies, but most of them can, in a modified version, be applied by companies in other industries, and in other countries.

3.1. Increasing the supply of labour and skills

3.1.1. Increased recruiting efforts

The difficulties associated with finding skilled workers have gradually increased over the past 5 years. Prior to that it was sufficient to open a job posting at the Croatian Employment Service (CES) and a selection of candidates was sent to the company for further assessment and employment, based on the interviews with employers. Since 2018 this is no longer the case, as companies report that the number of candidates they receive from CES is zero.

As a result, the companies have increased the frequency of job advertising, advertise in new media or expand recruiting area (Barnow et al., 2010). In contrast to putting a job posting on

CES, most of the surveyed employers in Croatia have increasingly started to advertise job openings by themselves, using different media channels.

Except advertising, companies can increase the efforts to attract people via word-to-word communication and through personal networks. They also need to increase attractiveness of job advertisements by paying more attention to their design and even hire consultants for help. The job advertisements have to ensure that the comparative advantages of the employer and the benefits for the candidates are effectively communicated.

3.1.2. Reduced minimum qualifications for the job

Companies tend to be slow at adjusting their job descriptions and requirements to a changing environment (Worley and Lawler, 2006). In order to increase the pool of job candidates, the companies should review their job descriptions and qualification requirements. The required level of skills, competencies and especially work experience can be adjusted depending on the level available on the labour market. Richardson (2007) argues: when a labour shortage occurs, employers are forced to accept workers with lesser qualities and accepting lower quality worker at the same wage level is an equivalent to an increase in pay.

The downside of this approach is that less skilled workers are less productive or produce lower quality outputs. (Barnow et al., 2010). They have to be trained further to reach the required skill level. This process can in some cases be long or costly, which undermines the effectiveness of the strategy.

3.1.3. Systematically improving working conditions to retain and attract employees

Improving working conditions can help attract workers or retain them (Barnow et al. 2010). At the same time, it can improve the engagement of existing employees. Employee retention approaches have developed gradually through history. Even 25 years ago, it was usual for a person to stay within one company for their entire working life. The employees gave loyalty in exchange for job security and gradual increases in salaries within companies with many layers of hierarchy. At the second stage, companies started to understand compensation and the working environment to be the most influential motivators. Later, with the idea of Maslow's hierarchy of needs, it was noted that factors affecting motivation of employees go far beyond security and compensation. The feeling of achievement, recognition, facing challenges, work-life balance, increased responsibility and the opportunity for personal development were newly recognized factors. The most recent approaches include building a corporate culture in which

every employee can be heard, feel their contribution, participate in decision making, be a part of a working group (team), feel appreciated and so on. (Gupta, 2004).

Barnow et al. (2010) states the following working condition factors: hours worked, type of supervision, access to better equipment, involvement in decision making, training and recognition. There are many ways to improve working conditions and organizational culture but they are beyond the scope of this thesis. Many companies regardless of their size can do a lot to increase the attractiveness of the environment for their employees and Croatian companies have been doing that intensively in last few years, as 66 % of surveyed companies claimed that the working conditions in manufacturing have increased considerably in last few years.

To build a brand as a desirable employer, the company has to ensure that their culture and values are effectively communicated and advertised both among employees and among public. Personal reputation of managers is also a factor. The goal is to attract the best available employees and make sure they want to work for the company, even if somebody else offers them a higher salary. "It is about creating a genuinely welcoming place, where employees love to work, based on credibility, respect, fairness, pride and camaraderie." (Gupta 2004: 3).

3.1.4. Encouraging engagement of current employees

Encouraging engagement of current employees should be done all the time, not only during labour shortages. Having a high quality performance management system with emphasis on transparency and fairness is a universally positive approach for every organization. According to Bernardin & Russell (2012) and Welch & Welch (2006), the management system should ensure:

- Clearly stated responsibilities and goals for each individual, team and department.
- Objective performance measurement.
- Performance based bonuses.
- Regular performance assessment meeting with each employee (at least once every 6 months).
- continuous learning and innovations.

Such a system is not simple to design. Implementation is also difficult, because a new performance measurement system fundamentally changes the way employees' performance is assessed, and how they are rewarded. Bourne et al. (2000) identify three main obstacles to implementation of the performance measures: resistance to measurement, computer system issues and top management commitment being distracted. The long term goal is to change

employees' behaviour patterns and ensure alignment between strategic goals of the company and personal goals of every employee (Bernardin & Russell, 2012).

If the company decides to change the performance system, it is critical that the new system is well thought out and fully implemented. The most dangerous situation is if the company stays stuck in the middle between the old system and a new one, because it causes a misalignment of goals, conflicts and dissatisfaction (Nolte and Haschen, 2010).

Pfeffer (1998) identified seven *high performance work practices (HPWS)* which, when implemented together, should increase employee retention, boost productivity and improve company's financial performance. Those include:

1. Employment security and internal labour markets
2. Selective hiring and sophisticated selection
3. Extensive training, learning and development
4. Employee involvement, information sharing, and worker voice
5. Self-managed teams (decentralized decision making)
6. High compensation contingent on performance
7. Reduction of status differentials

However, Boselie & van der Wiele (2002) and Adams (2002) state that HPWS shows most benefits in volatile environments, while in a more stable environment, control-oriented management would be a better solution.

Studies have shown that engagement of employees can be increased by offering them some type of flexible employment in order to improve their work-life balance (Pfeffer, 1998). Examples include²⁶:

- Flexible working hours

The employee chooses when to start and end work (within agreed limits) but works certain 'core hours', e.g. 10 am to 4 pm every day.

- Job sharing

Two people do one job and split the hours.

- Working from home

²⁶ From: <https://www.gov.uk/flexible-working/types-of-flexible-working>, accessed 11th August 2018

It might be possible to do some or all of the work from home or anywhere else, outside the regular office.

- Part time

Working less than full-time hours (usually by working fewer days).

- Compressed hours

Working full-time hours but over fewer days. For example, working 10 hours, 4 days in a week instead of 8 hours and 5 days.

- Annualised hours

The employee has to work a certain number of hours over the year but they have some flexibility about when they work. There are sometimes ‘core hours’ which the employee regularly works each week, and they work the rest of their hours flexibly or when there’s extra demand at work.

- Staggered hours

The employee has different start, finish and break times from other workers.

- Phased retirement

Default retirement age has been phased out and older workers can choose when they want to retire. This means they can reduce their hours and work part time.

3.1.5. Training workers for the job

If the reason for labour shortage is skill mismatch, solving it can be done through training of workers. According to Brücker et al. (2014) and Isbell et al. (1997) there are many reasons to train employees, most notably:

1. To increase the productivity or efficiency of a worker
2. To increase the quality of their output
3. To reduce errors and negative side effects of their work
4. To enable them to do the work they could not do before
5. To increase engagement and retention rates

Adult education in Croatia is divided into three groups (Guide to institutions for adult education, 2012): formal education, informal education and informal or self-directed learning.

Formal adult education is performed by authorized institutions, in accordance with approved learning programs, with the aim of gaining and improving knowledge, skills or competencies.

Upon completion, an official confirmation is issued (Guide to institutions for adult education, 2012). **Informal education** is any education which develops or improves knowledge, skills or competencies, for personal, social or professional needs. It is usually performed as courses or seminars and an official confirmation is not issued (European Commission Eurydice, 2018).

Informal learning presents processes where a person spontaneously accepts ways of doing and learns through everyday interaction, from their own experience, experience of other people and from other sources in their personal, social or working environment (Adult education act, article 3).

Self-directed learning are processes in which an individual conducts different learning activities on their own and takes full responsibility for the learning outcomes (Adult education act, article 3).

All types of education can be beneficial to both employer and employees. However, for most jobs in the manufacturing industry, workers are required to have a formal education in the field, to be legally allowed to carry out their work (Occupational Safety Act, 2014).

Both formal and informal education in companies can be carried out either internally (in-house training) or externally at dedicated institutions. Considering the labour shortages with skill mismatches in Croatia, some companies have implemented or are considering the implementation of activities directed to offering, supporting or encouraging training of current and future employees. The main purpose is to train people for jobs within the company where shortages are the most severe. The companies which have become more successful in in-house trainings, have started to offer training for other companies as well.

Formal adult education has to be done as prescribed by the Adult Education Act (2007). According to article 14, an institution for formal education can be founded by either the state, the local government, a company or a person, if they register the founded institution for such activities, and fulfil the given requirements regarding the space, people, and props for carrying out educational activities (Adult education act, article 16).

Examples of manufacturing companies which implemented formal training centres are: a company specialized for construction, manufacture of equipment and erection of power and industrial plants *Monting Ltd.* which founded *Monting učilište*²⁷ and *Bilfinger Đuro Đaković Montaža Ltd.*, a company specialized for performing work on power, industrial and petrochemical plants, and steel constructions which founded *Đuro Đaković Montaža Centar za*

²⁷ From: Monting school, available at: <http://www.monting.hr/?lang=en>, accessed 23rd of July 2018

zavarivanje d.o.o.²⁸. Both centres offer education and skill training for different welding techniques.

The companies therefore have the possibility to found formal education institutions as a part of their business. Financing in-house training however reduces profit margins and suppresses investments in other areas of business (Hobbs, 2017). As Barnow et al. (2010: 23) indicate: “Offering training for an occupation is often a major commitment for employers, and it is typically not provided unless most other approaches fail.”

Most of the time it is better, more effective and more cost-efficient to collaborate with existing educational institutions which provide education programs. High schools, universities and public training centres all offer different education programs. Employees can be sent to one of the existing improvement programs, or a customised program can be developed in collaboration with an external institution. A list and additional information about all institutions in Croatia which offer formal adult education programs can be found on the web page of Agency for Vocational Education and Training and Adult Education: <http://public.asoo.hr/Programi.aspx>.

In order to attract new employees, companies could financially support individuals who want to stop working in their own profession, be re-trained for another, and afterwards accept new position in the supporting company. In the long run, this should prove beneficial to both individuals, the company, and society as a whole, since existing human resources can be put to better use.

3.1.6. Employing retired people

The Pension Insurance Act gives the possibility of employing retired people, without them losing the right to receive pension funds. The options for retiree employment interesting for manufacturing companies according to the Pension Insurance Act (2013) are the following:

1. Employment contract for part time employment
2. Piece work agreement

According to Article 99 of the Pension Insurance Act (2013), retired people can be employed with an employment contract working a maximum of half of the normal full-time employment hours (20 hours a week in general, but can be redistributed). However, retirees benefiting from early retirement are not eligible for this kind of employment, at least not without losing their right to pension (see Chapter 2.1.4.).

²⁸ Đuro Đaković – Montaža d.o.o., available at: https://argonac.hr/about_us/, accessed 23rd of July 2018

This enables retired people to gain additional income while still getting state pension on one hand, and gives companies the opportunity to further employ highly experienced individuals on the other. Including retired people also extends the pool of available job applicants. Since skills and knowledge deteriorate over time if not used, best approach is to employ people who just got retired. This does not mean only people from one's own company; it can be extremely beneficial to hire retirees which retired from a competitor – they bring a lot of knowledge and skills which can be transferred to younger employees, and since they are only working part time, the costs will probably not be too high. A retired person can remain employed for as long as both parties agree on that (there is no forced retirement age).

The other option is signing a piece work contract with retirees. This, however, is used for temporary work, when the scope of assignment has a definite ending, and is thus not seen as employment.

3.1.7. Offering one-time bonuses for the newly employed

In order to attract workers from other companies, some employers offer one-time bonuses to each individual that joins the company.

This aggressive strategy may help attract workers from the competitors in the short run, but has some negative consequences – most importantly it increases turnover in the industry and can degrade relationship between companies. It also discriminates between newly hired workers and those who have been in the company for a long time. At some point the company decides to start giving employment bonuses; and every worker which joined the company before that point may feel deprived of the bonus.

In the practice, this is done by the employer offering a temporary employment contract (1 month) with a higher salary, and afterwards a new full-time contract with regular salary. The strategy can be misused by the employees, as they can choose to leave the company right after they receive the bonus. This can be avoided if the employer makes the temporary contract last 3 months, and the bonus is spread equally during these 3 months, before the full-time contract is put into place. The potential employee may refuse to enter into such an agreement, because after the temporary contract ends, the employer is not obligated to hire the employee for full time employment, if they decide that the shortage is over or that the worker is not a good fit for the company.

3.1.8. Paying recruitment bonuses to employees who bring in new workers

According to (Barnow et al., 2010), employees are not likely to recommend people who are unqualified or present a poor fit to the company culture because it would negatively affect their reputation. They also have the best insight about the work and working requirements in the company and can recommend good matches. To encourage employees to bring in new workers, companies can decide to pay bonuses.

To reduce the risk of new employees joining the company only to earn bonuses for current employees, and leave afterwards, the bonuses should be paid monthly, a part for each month the new employee stays in the company, up to a limit of 3 to 6 months. This should give enough time for both the employee and employer to estimate if they are a good fit.

The strategy is more viable for companies where employees are very likely to recommend the company as an employer of choice to friends and family. This likelihood can be estimated by running an anonymous survey among the company employees.

3.1.9. Raising wages

According to economic theory, an increased demand or decreased supply of a resource drives its price upwards. So a normal reaction of the companies is to increase the wages for the positions that are more difficult to fill. This needs to be done with great caution for multiple reasons (Barnow et al. 2010, Trendle 2008):

1. It takes a lot of time for labour supply to react to increased wage
2. It is not that easy to lower the wages when the market situation changes
3. May create internal imbalances in salaries among employees with similar job descriptions, followed by dissatisfaction of employees
4. May create internal imbalances among employees with different jobs inside the company
5. Raising wages decreases competitiveness and might even undermine the business model

Trendle (2008) states why labour market adjusts slowly to price changes (employer reaction time, employer response time, worker reaction time, worker response time) and concludes that for many occupations, the most important factor slowing down the response is the required training time. Depending on the legislation of the country and bargaining power of both the employer and employee, it might be extremely difficult or even impossible to lower the wages

when the market declines. The employer may be left with only two options: leave the wage high or lose a good employee to competition. It is a highly irreversible measure.

Additionally, it is very dangerous to raise wages for one person but not raise them for every other person in the company with the same job description. It may even not be allowed by company policies, but even if it was, internal imbalances would soon be visible and dissatisfaction and disengagement of other employees would start to show. Details of the individual employee's salary are confidential in most companies, but the amounts are usually very well known among the employees, regardless of them usually being exaggerated.

Factual or perceived, differences in wages create a pressure for increasing the wages of other employees as well (Trendle, 2008), and the employer soon finds themselves in a difficult position, as raising wages for all employees with a similar job description could be costlier than any other possible strategy.

This goes even further, because the differences in wages between different occupations can also be taken out of equilibrium. To illustrate, the wages of welders in northern Croatia have increased to a point where they are equalized with those of CNC operators. The occupation of a CNC operator requires more years in school, more experience, more knowledge and skill, and should be better paid, as seen from the workers' point of view. CNC operators find it difficult to accept that market forces and greater demand for welders have increased their wages more than the wages of CNC operators.

To some extent, employers in Croatia started to raise wages as a first measure to increased recruiting difficulty, but they have seen that this creates an upward spiral among companies competing for employees and increasing wages to a point where they can no longer operate profitably.

It is however one of the ways in which more profitable companies can push less profitable ones out of business.

In the long run, raising wages for a specific occupation increases the number of individuals attracted to this occupation, either in the form of a greater interest during school enrolment, or a greater interest in adult education programs.

To sum up, raising wages is a simple, yet costly strategy. It is viable only when there is a minor number of workers affected. In other cases, it is risky and other options have to be considered before implementing this one.

3.2. Lowering demand for labour and skills

3.2.1. Improving processes

To improve a process means to make it more efficient, i.e. make the process produce the same output with less input resources spent. This can be either due to innovation, or through continuous improvement policies such as *kaizen*. (Jacobson et al., 2009). Setting up formal feedback-and-improvement processes in plan-do-check-act circles helps foster many small improvements, raise productivity and improve the quality delivered to customer (ISO 9000, 2015). This is also something every company should do all the time, and not only when there is a labour shortage. In those times, however, companies should increase efforts to improve the most critical processes.

3.2.2. Reorganizing processes to a point in which unskilled labour can be employed

If skilled workers are in short supply, companies are encouraged to reorganize processes and employ unskilled labour. In manufacturing, this can be done through standardization. For example, the company can reduce the number of different product types they manufacture, divide processes into simpler tasks, create strict rules for carrying them out and employ a smaller number of skilled workers to do the work. This enables the company to use current or new employees from other occupations (Barnow et al., 2010). Further discussion requires a company-specific approach which is beyond the scope of this thesis.

3.2.3. Substituting Labour with Machinery and Equipment (automation, digitalization, robotics)

Usually when a process can be reorganized in simpler repetitive tasks, automation becomes more rentable and human labour is efficiently substituted with machines. With recent advances in technology, machines have become more flexible and can be used for more sophisticated tasks (Barnow et al., 2010). In manufacturing, it no longer means that only big-batch production can be automated, as with use of robots and additive manufacturing technologies, even production of prototypes can be effectively automated. Some jobs, however, are hard, impossible, or simply not feasible to be replaced by machines. This is especially true for on-site work and different services.

This strategy creates a shift from a labour-intensive business model towards a capital-intensive one. It can be used in both the short and the long term, depending on the task, but a cost-benefit analysis must be carefully made on each case separately.

3.3. Transferring demand for labour and skills to other parties

3.3.1. Using temporary agency workers

On 1st of July 2018 there were 91 registered temporary employment agencies in Croatia and the number has grown in the past three years according to Ministry of Labour and Pension System²⁹. Most of those (40) are registered in the capital city of Zagreb, 17 in Istrian county, and 10 in Slavonia.

Among the surveyed companies, 16 % indicated they use the services of temporary agencies for seasonal workforce shortages. The main advantage is the flexibility that agencies offer – in times when demand for labour is high additional workforce is hired; if the demand is low it is quick and inexpensive to lay them off.

3.3.2. Using cooperating partners, independent contractors

Companies use sub-contractors mainly for the work they do not do by themselves, or for the work which surpasses their capacity and has to be delegated elsewhere.

Although it requires some time to set up the processes in the beginning, this is a very successful strategy for short-term labour shortages and addressing peak volumes in general. In the long run, the subcontractors may start to experience shortages themselves and new approaches will be needed.

3.3.3. Using crowdwork

Instead of having their employees do a specific task, companies can decide to offer the task to the general public – and whoever does the task, gets paid for it. This is a form of outsourcing, usually done through internet platforms which “let the clients post a task to be completed by anyone meeting certain criteria” (Fair Crowd Work, 2018a). In that case “the crowdwork” is submitted digitally by virtually anyone in the whole world, for example: searching for information on the internet, photo tagging, product categorization and description, writing

²⁹ Data available at: <http://data.gov.hr/dataset/popis-agencija-za-privremeno-zaposljavanje>, accessed on 26th of July 2018

instructions, web ads, designing web pages, coding, translation, transcription, filling surveys, engineering, architecture, hand drawing, accounting, project management, customer support, IT helpdesk, administrative tasks. Leading platforms for digital tasks are Amazon Mechanical Turk and Clickworker.

Other platforms serve only as intermediaries between companies who sought work and individuals (freelancers) willing to do it. This includes services in transportation (Uber, Lyft), food delivery (Foodora), cleaning and domestic work (TaskRabbit, Helpling).

In the manufacturing, one example of crowdwork are service for making three dimensional models out of two dimensional drawings.

Crowdwork is sometimes also referred to as labour crowdsourcing or micro-task crowdsourcing (Fair Crowd Work, 2018a). It changes the rules of the business, since the individuals doing the crowd work are actually self-employed people (they are not employed by the platform or their task-giver) without any traditional worker rights (pension insurance, health insurance, unemployment insurance, paid vacation, paid leave etc.). This area is still not well regulated but there are many pressures to do that. Crowdwork is at the moment very interesting because it creates a “perfect market” where labour can be received from virtually any person in the world who is willing to do it for the stated price. And there are many reasons why crowdwork is very interesting to employers and the costs are very low, compared to wages that the employer must give to their own workers:

- Many people on the supply side
- Including people from low-income countries
- Crowdworkers are not paid by hour, only by work they do (down time or lack of engagement priced out)
- Crowdworkers do not receive traditional worker rights
- A big competition between workers (supply side) is created

This, of course, will put pressures on domestic labour markets to reduce wages, because employers will rather turn to crowdwork, than employ people in certain professions. Labour unions are therefore lobbying for better employee protection and regulation of crowdwork (Fair Crowd Work, 2018b).

In Croatia, crowdwork is still a new approach, unknown to most companies, and unregulated within Croatian legislation (Bjelinski Radić, 2017).

3.4. Government initiatives

Although the focus of this thesis is on the strategies that employers apply, some of the possible government initiatives for overcoming shortages will be explained. Employers need to be aware of them, willing to support them, and ready to adapt to them.

Ducanes and Abella (2008) list the following government policies for addressing the shortages:

- Moving towards more capital intensive technologies by increasing investment (this mirrors aforementioned strategy of substituting labour with machines and equipment).
- Attracting more workers in the labour force from certain under-represented demographic groups (for example increase women's labour participation).
- In cases in which there are workers who would like to work at current wage levels but lack the needed skills, training of workers and using active labour market policies.
- Increasing the supply of foreign labour.

In addition, the government can influence the public opinion of manufacturing jobs' attractiveness. According to Zieminski (2010), only one in 10 American teenagers see themselves in a blue-collar job at age 30, while the proportion is even lower in Japan.

"Parents, teachers, guidance counsellors, and entire communities need to be made aware of how different, more exciting and more rewarding manufacturing is as a career" (Hobbs, 2017: 2).

66 % of surveyed companies responded that they agree or strongly agree that the working conditions of manufacturing jobs in Croatia have significantly improved over the past few years. 72 % stated that they agree or strongly agree that the average wage in manufacturing industry has increased more than the average pay check in Croatia.

The manufacturing jobs are better paid for than they were before, and the working conditions have improved. The question is, are young people (and their parents), who are choosing their education, aware of this? Has the perception of attractiveness for manufacturing jobs also increased in the public eye?

Both the companies and the government could increase the number of applicants in the field by starting an advertising campaign and communicating a positive image of manufacturing jobs. Factories are cleaner and far more technical places to work than people realize (Hobbs, 2017). Therefore, a solution might be to organize "visitor days", when the general public is invited to visit the production plants, and witness the working conditions in person. This could encourage more students to enter technical high schools, but also increase the interest for requalification of existing employees in other professions towards manufacturing jobs.

The Croatian government carrying out a number of active labour market policies in 2018³⁰:

1. Employment subsidies
2. Employment subsidies for acquiring first work experience / internship
3. Subsidies for specialization
4. Self-employment financial support
5. Education of the unemployed
6. Subsidies for workplace training
7. Professional training for work without establishing a working relationship
8. Training to acquire appropriate work experience (30+)
9. Public work
10. Subsidies for job preservation / Job preservation support
11. Permanent seasonal worker concept

As reported by Eurofound (2017: 7):

“The most important legal changes were the adoption of the Act on Employment Mediation and Unemployment Rights (NN 16/2017 (363)) and the amendment to the Act on Employment Initiatives (NN 16/2017 (364)). Act No. 363 aims to tackle the problem of unemployed people in Croatia who are reluctant to accept jobs outside of their place of residence, while Act No. 364 looks at abolishing the financial incentive to employ unemployed people without work experience and the long-term unemployed people, redefining the target group of unemployed people, regulating the rights of those engaged in vocational training without being employed, and enabling the rights of permanent seasonal workers for financial assistance.”

Some of the policies are focused on encouraging education and training in order to retrain unemployed people. Other relate exclusively to measures for acquiring the first work experience, intended to reduce youth unemployment, with the aim of:

1. acquiring work experience in general,
2. acquiring work experience for the purpose of passing a master's or professional exam,
3. acquiring work experience and passing an expert or state exam.

³⁰ From: <http://mjere.hr/>, accessed on 9th of August 2018

The duration of these subsidies is limited to 6, 12 or 24 months, depending on the subsidy.

As an example, the policy directed to lowering youth unemployment among highly educated people, called „professional workplace training without employment“, will briefly be described. It is intended for people under the age of 30 who have less than 12 months of work experience (Government measure, 2018). Before, young people were unable to get first job because they did not have any experience and at the same time could not get any experience because they did not have a job. If employed, in the first few months they are overpaid, because they still do not contribute much to the employers. The idea behind the policy was to create a temporary employment form, inexpensive to employers, to encourage them to hire people without prior experience and train them for the job. The compensation which is received for such work is very low for university educated workers – 2,751.84 kn (approx. 372 €) per month, which is the minimum net pay in Croatia (Minimum wage regulation, 2017). After 12/24 months they are thought to be trained and can no longer be employed under this conditions. However, considering the relatively big number of students finishing university, every year new graduates are employed for professional training – enabling companies to have a stable source of university graduates. This influences the normal labour market and negatively affects average pay of highly educated workers. Among some of the people, this is also seen as an undervaluation of their work, and as a source of discontent, is one of the main reasons for leaving Croatia.

This review has identified the challenges and possible responses to challenges of labour force shortages. What remains unknown is exactly how different Croatian companies approach labour shortages: which proportion of companies use mentioned strategies, are there any novel approaches, which of those are most successful. What are future scenarios anticipated among Croatian manufacturing companies?

4. Methodology

This study used a mixed-method approach incorporating interviews and a survey. The survey was used to access participants where a face-to-face interview was not possible. The sample included 32 managers in Croatian manufacturing companies. The sample structure of surveyed companies regarding the number of employees and the size of the enterprise is given in Figures 16 and 17, respectively. The geographic layout of surveyed companies is given in Figure 18. The sample is representative for the manufacturing sector in northern and central Croatia.

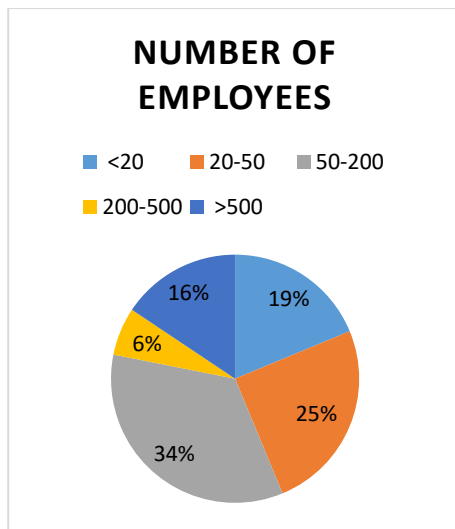


Figure 16. Surveyed companies – number of employees

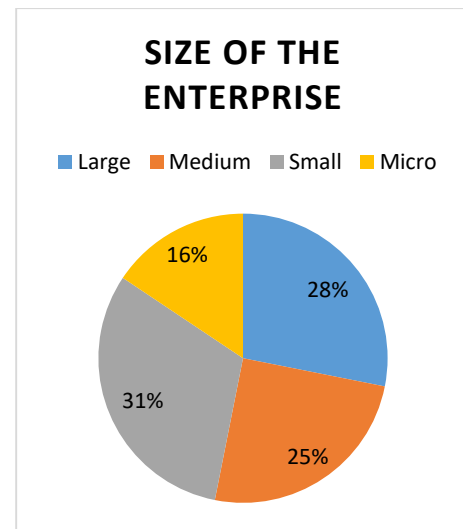


Figure 17. Surveyed companies – size of the enterprise

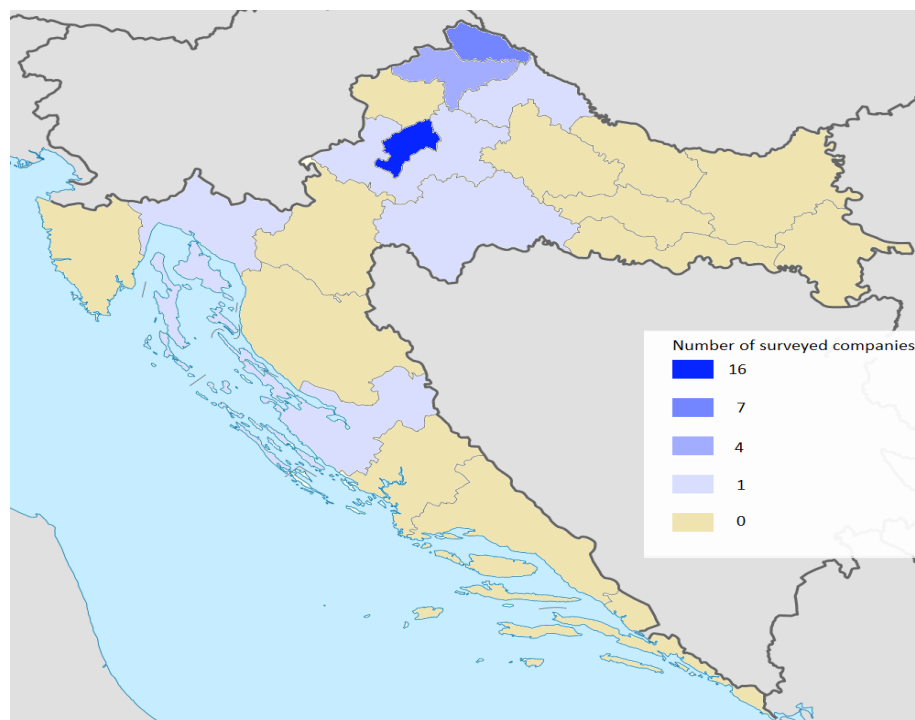


Figure 18. Geographic coverage of the sample

The survey was sent to 87 companies in total but only 32 responded. It may be assumed that a lot of the companies who did not take part in the survey did so because labour shortages are not a relevant topic for their daily business. This bias has to be taken into consideration when interpreting the results of the survey.

The interview began by establishing each company's main activities, their market situation, and their approach to hiring workers. Specifically, managers were asked which media they use for job advertising. The topic of worker shortages was then explored, focussing on their causes and consequences. The managers were then asked what actions they are taking to address the challenges of worker and skill shortages and how they see future scenarios regarding them. Open-ended questions were used to initiate other topics connected with labour shortages.

In the final section of the interview, employers were asked to consider the value of specific options which may affect the company's choice of strategy for addressing labour shortages. For each strategy, four answers were possible: 1. not applied, 2. planned for next year, 3. applied, but without much success and 4. applied, with a lot of success.

5. Data analysis

81 % of the sample have stated that they have worker shortage problems all the time or most of the time. About three quarters agree or strongly agree that low wages, emigration of skilled workers and the low number of students entering technical high schools are significant causes of skilled worker shortages.

94 % of sample responded that demand for their products or services has increased in last 2 years. 53 % plan major investments in next 18 months. 66 % indicate that the returns on those investments rely heavily on availability of skilled workers.

5.1. Consequences of worker shortages for employers

The main consequences which employers identified included:

1. Delays with product/service delivery.
2. Increased workload on existing employees / overtime hours.
3. Customers' orders have to be declined / Customers go to competition.
4. Longer lead times.
5. Suboptimal organization of production (downtimes, lower productivity, machines underused).
6. Lower product/service quality.
7. Specific skillsets difficult to replace in case an employee leaves the company.

Based on the interviews, topics 1, 3, 4 and 6 are also connected with ruined reputation among existing and potential customers, which is a devastating consequence for the company. The interviewees stated that when unable to eliminate causes of labour shortages, another approach is to leverage the consequences by reducing symptoms.

5.2. Media used for job advertising

Almost all (94 %) of the surveyed companies place a job posting at Croatian Employment Service when looking for workers. The same number of surveyed companies, but less frequently, use their personal networks and word-of-mouth to search for job applicants. Also based on the interviews, personal recommendations present the most reliable source of competent employees. Web advertisements are the third most used media for communicating job postings (81 %).

The more expensive methods for attracting job candidates are billboards and television commercials, which are never used by 88 % and 97 % of the companies, respectively. Flyers, however, are a very inexpensive way of reaching many potential candidates because their coverage can be targeted (high schools, competitor parking lots, restaurants etc.). They are nonetheless never used by 88 % of the surveyed companies.

Other approaches include use of job fairs to present the company as a desirable employer. The whole dataset regarding the media used for job advertising is given in Table 3.

Table 3. Survey results – media used for job advertising

	Always	Most of the time	Sometimes	Rarely	Never
Croatian Employment Service	19 %	56 %	19 %	3 %	3 %
Personal networks		44 %	47 %	6 %	3 %
Web advertisements		53 %	28 %		19 %
Newspaper advertisements		6 %	47 %	9 %	38 %
Company newsletter advertisements	3 %	31 %	19 %	6 %	41 %
Recruiting directly at high school	3 %	22 %	34 %		41 %
Temporary Employment Agencies		25 %	31 %		44 %
Social networks (Facebook, LinkedIn)		9 %	28 %		63 %
Radio commercials		3 %	19 %		78 %
Other approaches		16 %	6 %		78 %
Billboards		3 %	9 %		88 %
Flyers		3 %	9 %		88 %
Television commercials			3 %		97 %

5.3. Additional strategies

In addition to workforce management strategies found in the literature, the interviews have identified 4 additional strategies to be used for addressing labour shortages:

1. Opening subsidiary plants in locations with better workforce environment
2. Mergers and acquisitions
3. Regular recruiting at local college or vocational school
4. Offering scholarships to students

5.4. The most common strategies

75 % of the sample indicate that they work systematically on improving the working environment for the employees. This includes improving working environment and safety, offering more flexibility regarding vacation planning, investing in worker training, investing in better tools and equipment, organisational improvements to ease the workload, awarding bonuses for top employees and presenting company goals and results more transparently.

72 % of the sample uses subcontractors for work they cannot do themselves. Based on the interviews, some companies also use subcontractors for work they can do themselves, when their own capacity is full. Two thirds indicate that this is a successful approach to overcoming labour shortages.

To increase the pool of job applicants 59 % of the companies lowers their selection criteria. On average 26 % of companies consider it a successful approach. This has to be considered on a case to case basis, because with some jobs, even an unskilled worker can provide greater benefits than costs, but with other jobs, an unskilled worker can easily cause a lot of damage to products, tools, machinery, and be seen as a bad choice.

Only 9 % of the companies have opened a plant at a different location with more available workforce, none of them being small or micro enterprises. 9 % of companies took part in a merger or acquisition.

Crowdworking was used by as little as 6 % of the sample, with none of the companies identifying it as a successful approach in their industry.

The whole dataset regarding the strategies used is given in Table 4.

Table 4. Strategies – ordered by frequency of use

Strategy	Percentage of companies applying the strategy			Percentage of companies who applied the strategy and think applied strategy is a success				
		0%	50%	100%		0%	50%	100%
Increased recruiting effort (active job advertising)	78 %	<div></div>			32 %	<div></div>		
Systematically improving working conditions	75 %	<div></div>			50 %	<div></div>		
Systematically improving company’s image as an employer	72 %	<div></div>			35 %	<div></div>		
Using cooperating partners, independent subcontractors	72 %	<div></div>			65 %	<div></div>		
Regular recruiting at local high schools	63 %	<div></div>			50 %	<div></div>		
Reducing minimum qualifications for the job	59 %	<div></div>			26 %	<div></div>		
Substitution of labour with equipment and machinery	53 %	<div></div>			59 %	<div></div>		
Raising salary for demanded jobs	50 %	<div></div>			19 %	<div></div>		
Improving the perception of manufacturing jobs’ attractiveness	50 %	<div></div>			31 %	<div></div>		
Establishing training centres within the company	44 %	<div></div>			43 %	<div></div>		
Offering scholarships to students	41 %	<div></div>			69 %	<div></div>		
Reorganizing processes with aim of employing unskilled workers	38 %	<div></div>			42 %	<div></div>		
Giving one-time bonuses to newly employed	22 %	<div></div>			29 %	<div></div>		
Employing retired people	19 %	<div></div>			83 %	<div></div>		
Using temporary employment agencies	16 %	<div></div>			40 %	<div></div>		
Offering job-and-accommodation packages	13 %	<div></div>			50 %	<div></div>		
Opening plants in locations with better workforce environment	9 %	<div></div>			67 %	<div></div>		
Mergers and acquisitions	9 %	<div></div>			33 %	<div></div>		
Using crowdwork	6 %	<div></div>			0 %	<div></div>		

5.5. The most effective strategies

There are many strategies companies try in order to attract more workers or reduce the amount of labour they need.

Interestingly, although rated as the most effective approach with a success rate of 81 %, *employing retired people* is used by only 19 % of the surveyed employers.

Companies which offer scholarships to students are generally highly satisfied with what they get in return, with 69 % seeing it as a success. Interviews identified that this is because students normally do the apprenticeships in same companies and they are trained and assessed in advance. The companies are also able to grant scholarships on a year per year basis, make the selection each year and finance only the candidates which continually show most promise.

Raising the salary for the jobs in demand (19 %), reducing minimum qualifications for the job (26 %) and giving one-time bonuses to the newly employed (29 %) are seen as the least successful approaches.

The whole list of strategies and corresponding survey answers is given in Table 5.

Table 5. Strategies – ordered by success

Strategy	Percentage of companies applying the strategy			Percentage of companies who applied the strategy and think applied strategy is a success				
		0%	50%	100%		0%	50%	100%
Employing retired people	19 %	<div></div>			83 %	<div></div>		
Offering scholarships to students	41 %	<div></div>			69 %	<div></div>		
Opening plant in locations with better workforce environment	9 %	<div></div>			67 %	<div></div>		
Using cooperating partners, independent subcontractors	72 %	<div></div>			65 %	<div></div>		
Substitution of labour with equipment and machinery	53 %	<div></div>			59 %	<div></div>		
Systematically improving working conditions	75 %	<div></div>			50 %	<div></div>		
Regular recruiting at local high schools	63 %	<div></div>			50 %	<div></div>		
Offering job-and-accommodation packages	13 %	<div></div>			50 %	<div></div>		
Establishing training centres within the company	44 %	<div></div>			43 %	<div></div>		
Reorganizing processes with aim of employing unskilled workers	38 %	<div></div>			42 %	<div></div>		
Using temporary employment agencies	16 %	<div></div>			40 %	<div></div>		
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Increased recruiting effort (active job advertising)	78 %	<div></div>			32 %	<div></div>		
Improving the perception of manufacturing jobs’ attractiveness	50 %	<div></div>			31 %	<div></div>		
Giving one-time bonuses to newly employed	22 %	<div></div>			29 %	<div></div>		
Reducing minimum qualifications for the job	59 %	<div></div>			26 %	<div></div>		
Raising salary for demanded jobs	50 %	<div></div>			19 %	<div></div>		
Using crowdwork	6 %	<div></div>			0 %			

Additionally, an analysis of the data was conducted to determine whether there is a relationship between the size of the enterprise and the choice of strategy. Non-parametric Kruskal-Wallis test was used to examine the null-hypothesis, H_0 .

H_0 : There is no statistically significant difference between the size of the enterprise and the chosen strategy.

Statistical analysis was conducted at confidence level of 95 % with alpha risk 0.05. Appendix 2 shows calculated Kruskal-Wallis test p -values for each strategy.

The analysis has shown that there is a statistically significant difference between the size of the enterprise and the following strategies, both of them being used by larger enterprises: using temporary employment agencies and substitution of labour with equipment and machinery.

None of the surveyed micro and small enterprises use temporary employment agencies to address labour shortages. Among middle-sized enterprises, 62.5 % do not use temporary employment agencies, but 38.5 % do. Temporary employment agencies are also used by 33.3 % of surveyed large enterprises.

Further analysis shows that substitution of labour with equipment and machinery is used more frequently by middle and large enterprises, with 62.5 % of middle and 88.8 % of large enterprises indicating that they do apply this strategy.

For all other strategies, there was no significant difference between choice of strategy and size of the enterprise.

5.6. Employer recommendations for solving worker shortage problems

The surveyed companies had the chance to give their own suggestions for the government, the school system, other employers etc. for addressing labour shortage problems in Croatia. The following suggestions were given:

- Reduce contributions and taxation of wages
- Reduce other taxes and contributions which affect competitiveness
- Raise limits for non-taxable payments to employees
- Adjust quota for high school enrolment for professions in short supply
- Improve the public image of craft trades
- Adjust high school curriculum to requirements of the employers on the labour market

- Encourage collaboration between employers and educational institutions
- Provide governmental scholarships to students studying for deficit professions
- Improve working environment
- Support and encourage training of the unemployed
- The government should secure better pension incomes
- Support and encourage worker mobility within the country

Employers argue, that reducing tax and/or contribution will increase the amount a worker receives for their work, without increasing the costs for the employer and reducing their competitiveness on the market. 31 % of surveyed employers suggested this approach.

People working in informal economy as a factor contributing to labour shortages was reported by several employers.

Further, interviews with employers have revealed that:

1. the school curriculum is not adequate for preparing students for working in the industry.
2. there are not enough students enrolled in technical schools compared to jobs created since manufacturing jobs are generally seen as less attractive.

Employers feel that too many children are more attracted to gymnasiums and seeking white collar jobs, because the image of jobs in manufacturing is rather poor.

Among vocational schools, employers explain that more focus should be given to craft and trade skills, and less emphasis put on general knowledge. They hope, however, that the newly implemented curriculum change will modernize the school system and provide better workforce in due course.

Employers feel that if the government finds ways to subsidize training programs, it would help both the unemployed and the employers, giving positive results to society as a whole.

75 % of the surveyed employers answered that they are systematically working to improve working conditions for jobs in high demand, and 50 % of those think of it as a very successful approach. Based on the interviews, better working conditions give companies an edge for receiving better job applicants and attract them with less monetary compensation. Employers are suggesting to each other to do the same to help improve the image of manufacturing jobs in the public eye, attract more workers to the industry, and increase lobbying and bargaining power with the government.

As one of the interviewees points out, if Croatians work in Austria as foreign workers, they earn much higher pensions, compared to what they earn in Croatia, even if they work abroad for only a few years. This also negatively increases the amount of undeclared work, since pensions, as a legal employment benefit, are modest.

5.7. Future scenarios

Interestingly, none of the surveyed companies agree that it will be easier to hire workers in next 2 years. They believe that the situation is about to get even more challenging in the next few years.

Employers also tend to think that they did everything they could to address labour shortages, and seek further actions from the Croatian government. Some of the companies in the north fear that many workers will find jobs in Slovenia and Austria, which will cause upward pressures on the wages in Croatia. Others think that the image of craft jobs is improving and more workers will be available in 3 to 5 years. Most of them agree that some companies which will not be able to retain workers will have to downsize and even cease their operations. One of the interviewees points out that labour shortage is not severe at all; the problem is, however, that Croatia has never experienced such a thing as a labour shortage before, and does not know how to react to it.

6. Discussion

Most companies stated that the demand for their products is rising. Many of them are planning significant investments in the next 18 months to increase production volume, investments which require additional workforce. The supply side factors are also contributing to the labour shortages

This indicates that the need for a skilled workforce in the future is very likely to increase even further and, unless there is a new economic crisis, the workforce shortages in Croatia will remain a big concern for many years ahead. This is consistent with employers expecting that it will be even more difficult to hire workers in the next 2 years, which in turn makes it extremely important for companies to design and implement successful workforce management strategies which are the best fit for their organisation.

6.1. Strategies

The most common strategy among the sample is systematically improving the working conditions in order to retain and attract employees. This approach has, at least to some degree, no high costs associated with it and can be done by any company. Smaller, flat organized companies are generally much quicker to make changes than big companies with budgets and more complex decision making patterns. The effect gained, however, is not directly measurable.

Employing retired people was regarded as a strategy with the highest success rate. According to Croatian law, retired people can be employed part time for up to 20 hours a week. Elderly people may not be as fast or as prone to using computers as younger workers, but their experience and skills cannot be matched. Retired people are therefore to be put in roles where they can easily transfer their knowledge to other employees. Of course the company must be organized to use and encourage this skill transfer. Employing retired people has a lot of potential for easing labour shortages in the manufacturing sector and is an example of how to attract more workers from certain under-represented demographic groups.

Crowdworking is a rather new approach which is still controversial and unfamiliar to most employers. It is not seen as a successful strategy. This is because its applications have yet to be discovered by manufacturing companies. Workers which are in short supply, however, are those directly (and physically) involved in the production process. Crowdworking can only be used for some periphery processes, e.g. preparing 3D models in machine part manufacturing.

Raising wages helps retain workers and attract them from other companies in the short term, and also causes more people to enter the occupation on the long term. It is however not seen as particularly successful strategy for overcoming labour shortages. As stated previously, increasing wage of one person in the company puts pressure to increase the wages of other employees as well. Although great from employee point of view, this new increase causes higher labour costs and leads to decreased competitiveness. Increased labour costs also cause automation to be more rentable, and subsequently decreases the demand for labour. Best alternative to raising wages is giving employees non-monetary benefits.

The additional strategies identified and applied by employers are also means to address labour shortages. These are: opening additional plants in locations with better workforce environment, mergers and acquisitions, regular recruiting at college or vocational school and offering scholarships. Although these are not novel approaches, their impact has not been discussed among the literature dealing with labour shortages.

6.1.1. Opening additional plants in locations with better workforce environment

This strategy can be seen as increasing the supply of workers available to the company, but also as a means of easing the need for workers on the company's main location. Companies located in counties with scarcity could surely benefit from moving a part of their operations to locations where there is plenty of workers (eastern parts of Croatia, Serbia, Bosnia and Herzegovina). It has to be noted that opening subsidiary in another country requires a good understanding of local legislation and culture, while moving inside the country is much simpler.

Many factors have to be considered in such a case, to ensure that the benefits a new plant would provide are greater than the costs, including investment costs (for setting up and moving production to another location), operational costs on the new location, transportation costs between locations and agency costs (remote locations are associated with lower control and potential productivity gap).

Ideally, the company should move only the labour-intensive part of their operations so the need for additional capital investments is kept low. To lower the initial investment, companies could rent an existing building rather than build a new one, and move the existing production equipment from their main location. They should also try to keep the new location flexible and able to effectively scale volume.

If the company decides it is no longer viable to have operations there in the future, it can withdraw the equipment and cancel the rent contract to quickly downsize operations without necessary costs.

One of the most challenging tasks is probably ensuring adequate training for employees at new location and the sharing of knowledge between remote plants.

6.1.2. Mergers and Acquisitions

Instead of opening a new plant, another possibility is to acquire an already established partner or competitor who has plenty of workers available, and move some of the operations there.

This is, however, a lengthy process with considerable investments in the beginning and is therefore reserved for companies with stronger financial backgrounds. The potential revenue and costs synergies have to be assessed. Proper integration and the use of those synergies has to be assured. It is also difficult and costly (if not impossible) to revert the change if the new location stops providing benefits. This is a long-term strategy and the company must be sure that it fits their other strategic goals.

Opening plants in locations with better workforce environment, mergers and acquisitions are reserved for bigger companies only, and are therefore not used by most employers.

6.1.3. Regular recruiting at college or vocational school

Local colleges and high schools are good sources of job candidates. There are many ways in which companies can collaborate with schools to address the skill shortage problems: build the image of a profession in the public eye (creating interest for the field), suggest curriculum changes, offer apprenticeship possibilities, open doors for students and children to see what a day in a manufacturing facility looks like, to help them visualize a career and decide about further education, collaborate on projects, help equip schools with necessary equipment.

Some schools also organize job fairs, a day when the interested companies come to school to present themselves, to attract apprentices and future employees, competing to draw the best talent.

Companies, however, normally cannot directly influence the schools to adjust the learning programmes to better suit the skills demanded by them, since the Ministry of Science and Education decides on the curriculum.

6.1.4. Offering scholarships

The employers could increase the attractiveness of a particular occupation for young individuals and connect with them by offering scholarships. Since most educational programs in the manufacturing industry have obligatory apprenticeships, usually done with future employers, providing financial aid to attract young students can be altered: instead of giving scholarships, employers can increase compensation provided for time spent during an apprenticeship. Dual education system, successfully applied in Germany, Austria and Switzerland, consists of students doing longer periods of apprenticeships. The employers in Croatia could offer the students apprenticeship programs during summer holidays, which will have higher qualification requirements (in order to select the best students and encourage excellency) and will be better rewarded than the obligatory apprenticeship.

6.2. Employer recommendations for solving worker shortage problems

It is always beneficial to collect information from those most affected by it. Some of employers' suggestions were already addressed in Chapter 3, and the other are discussed below:

- **Reduce contributions and taxation of salaries**

An average *total cost of salaries* to *net income* ratio is about 1.7 in Croatia for a monthly net income of 6,900 kn (approx. 930 €). This equals to a tax wedge of 41.2 %. This is compared to data of OECD countries in Figure 19 (OECD, 2018). The graph shows that the tax wedge in Croatia is somewhere in the middle among European countries and well below neighbouring Hungary and Austria.

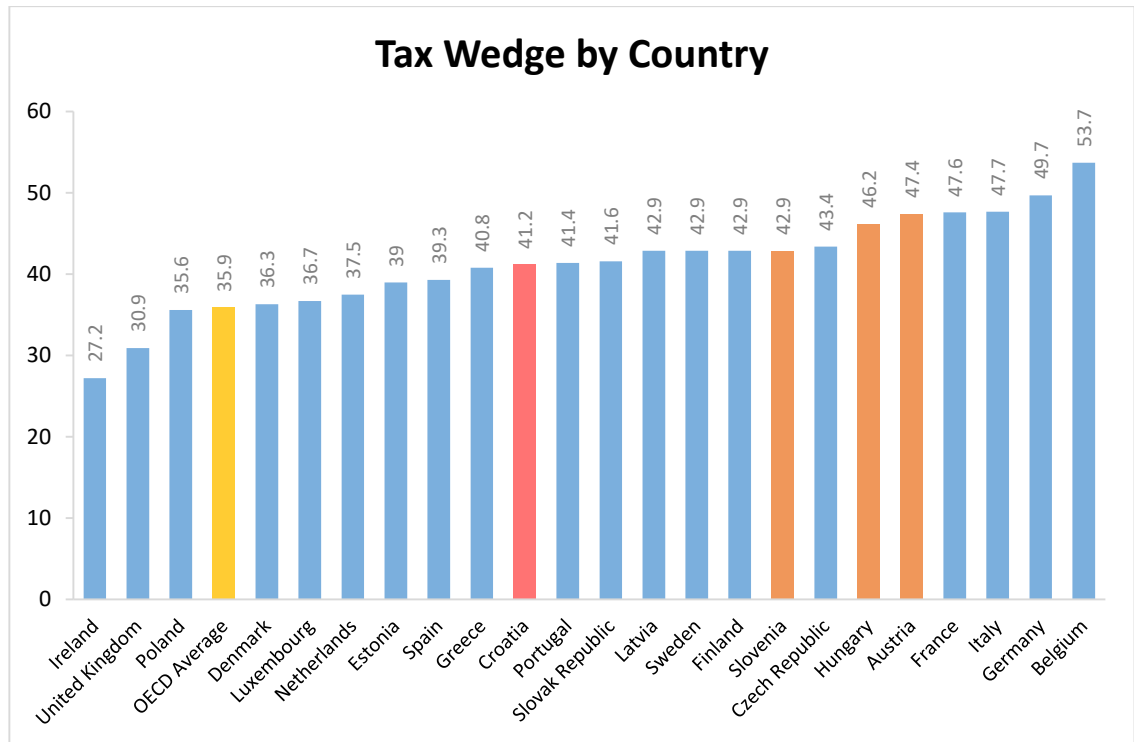


Figure 19. Tax wedge by country (2017)

This data points out that high tax wedge might not be the most important topic for labour shortages. As of 2nd of August 2018, the Croatian government has proposed to lower unemployment insurance from 1.7 % to 0 % and injury-at-work contributions from 0.5 % to 0 % but increase health insurance contribution from current 15 % to 16.5 %. This is to be applied from 1st of January 2019 and will reduce the tax wedge to 40.8 %, which is not a significant difference for employers or employees.

- **Reduce other taxes and contributions which affect competitiveness**

In 2016 there were 547 different types of contributions accounting for about 9 billion kunas (1.2 billion €) or 2.7 % of the Croatian GDP³¹. Making the system simpler by reducing the number of contributions could reduce administration costs for the government. Reducing the contribution may improve the competitiveness of Croatian companies.

³¹ Based on: https://www.mingo.hr/public/documents/Registar_neporeznih_davanja_2016.pdf and analysed by: <https://www.crnaknjiga.hr/crne-vijesti/upravljanje-drzavnom-imovinom/popis-svih-nameta-necete-vjerovati-tko-najvise-guli-gradane-i-poduzetnike-medu-njima-su-i-neki-bizarni-primjeri/>, accessed on 4th of August 2018

- **Raise limits for non-taxable payments to employees**

Companies in Austria give the employees a 13th and 14th salary, which are taxed at a very low rate of 6 %³². In Croatia, the maximum amount which can be given to an employee without tax is 2,500 kn a year (about 330 €) (Rules for income taxation, 2017). This is effectively similar to reducing the tax wedge and suggests a different redistribution of income, where employers and employees get more, and the government less.

- **Adjust quota for high school enrolment for professions in short supply**

One of the employer interviews has revealed that the perceived attractiveness of manufacturing jobs is gradually improving, and that the technical high school in Čakovec is fully overbooked at the beginning of each year. They also state that a job can be quickly found for each of their students upon graduation. Most of the students have jobs promised to them even before graduation, by the companies in which they have done their apprenticeships. Although they have somewhat increased the number of students in technical fields, they cannot increase it further for multiple reasons: 1. They do not have the necessary infrastructure and a sufficient number of teachers for further increases and 2. If they enrol more students, other schools in the area where interest for enrolment is very low will have troubles attracting minimum number of students. This brings, however, additional question of whether schools are organized in such a manner that they can quickly respond to “volume changes”, i.e. changes in the number of students attending them? It might be more difficult to reduce the number of students in school programs which are not needed by the industry (will teachers in those schools lose their jobs?), than to increase it when there is a high demand.

The number of students which can be enrolled in a school each year has to be proposed by the school, approved by the local government and finally approved by the Ministry of Science and Education.

25 % of surveyed employers state that these quotas have little or very little connection to the demands of the labour market. Other 75 % did not give their opinion on the topic.

This is consistent with report from Eurofound (2017: 30) which indicates:

„One of the main problems of the labour market in Croatia is a lack of qualified human capital and a mismatch of skills and labour market needs. In Croatia an important issue is an insufficient link between the education arena, the economy and employers; not

³² From: <https://www.virtualvienna.net/working-in-vienna/salaries/>, accessed on 4th of August 2018

enough attention is given to the estimates of future trends and needs of the labour force. This causes problems in providing education and skills programmes compatible with the skills and occupations sought on the labour market. One of the main reasons for the high incidence of unemployment among young people in Croatia is widespread skill mismatch.“

As further explained by (EC report, 2013: 4):

“In July 2010, the Government of Croatia issued the Decree on Monitoring, Analysis and Forecast-ing Labour Market Needs for Particular Professions, and on Making and Taking into Account the Recommendations for Educational Enrolment Policy. The Government obliged the Croatian Employment Service (CES) to develop a methodology for analysis and forecasting labour market needs (including the reduction of bottlenecks), and to produce the recommendations for enrolment policy.”

This is a very good approach to adjusting educational policies towards the needs of the economy, but some employers question whether the requested changes are really put into practice.

- **Adjust high school curriculums to fit the requirements of the employers on labour market**

The curriculum change is an ongoing topic in Croatia since 2014. Multiple governments have worked on it, and an experimental program will be applied in 74 schools in the school year of 2018/2019. The main goals of the curriculum change include: increased transparency of learning outcomes, increased grading transparency, tighter connection between the educational system and the labour market, different ratio between general knowledge and trade skills learned. The results will be seen in several years.

- **Encourage collaboration between employers and educational institutions**

The Croatian government is already offering different subsidies for training of the unemployed, workplace trainings and so on.³³ The information about the existence of these subsidies has unfortunately not reached all employers.

- **Support and encourage training of the unemployed**

Given that Croatia has a lot of unemployment on the one hand and a lot of vacancies on the other, training people for new job is one of the best ways to go towards equilibrium

³³ From: <http://mjere.hr/>, accessed on 9th of August 2018

in the short term. It would be beneficial to the Croatian society if the government finds ways to encourage companies to participate and share their resources for skill trainings.

- **Support and encourage worker mobility within the country**

As already shown, locational gaps are also present in Croatia, and encouraging mobility could provide benefits to both the unemployed and the companies seeking additional workers.

Many of those suggestions are based on comparing business environments between Croatia and Austria. Whether those measures would indeed help solving workforce shortage problems in Croatia, remains to be further analysed.

7. Conclusion, implications and further consideration

Labour shortages are currently an important managerial topic in the Croatian manufacturing industry. There are many factors causing labour shortages in Croatia: shrinking and ageing population, net emigration, locational and skill gaps and an increased demand for labour in recent years.

This thesis investigates labour shortages in Croatia from the employers' point of view, with central research questions:

How do Croatian manufacturing companies address the challenges of workforce shortage?

What workforce management strategies are most effective in the Croatian context?

The study gives an overview of different approaches to be applied in manufacturing companies in scarce workforce environment, offers action suggestions for employers hit by the labour shortages, and warns about potential drawbacks of those actions.

In total 19 strategies which companies can use to address the issue of labour shortages are identified, explained and classified into groups. The choice of strategy will depend on the size of the enterprise, the estimated length of the shortage, the job position in question, the industry, urgency and other strategic goals of the company. A mixed-method study including interviews and a survey among 32 manufacturing companies in northern Croatia was conducted. Among the surveyed sample, most frequently used strategies are: increasing recruiting efforts, improving working conditions and improving the image of company as an employer. However, strategies seen as most successful are: employing retired people, offering scholarships to students, opening plants in locations with more workforce and using subcontractors. Strategies which are frequently used and perceived as successful are: substituting labour with machines and equipment and using subcontractors. The least successful strategies are: raising wages and reducing minimum qualifications for the job.

The suggested strategies can, to some extent, be applied in other industries and other countries.

There are a few suggestions of what the Croatian government could do to address labour shortages: encourage domestic mobility, increase immigration quotas and ensure the number of students in secondary schools fits the needs of the labour market. Furthermore, there is a lot of potential in encouraging inactive population to join the workforce. Both the employers and the government should provide benefits and encourage this transition. The government and employers should also work together to increase the perception of attractiveness of manufacturing jobs to attract more people to those occupations.

For further research, the interaction between different strategies should be investigated on a larger sample, to see if a combination of two or more strategies provides synergies when all are applied simultaneously. The same set of strategies can be investigated in other countries. Different policies, suggested by the employers, should be further analysed in the Croatian context.

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Appendix 1. Survey questionnaire

INTRODUCTION

I am Igor Novak, a MBA candidate at Technische Universität Wien in Vienna, Austria. For my master thesis, I am researching which strategies Croatian manufacturing companies apply to deal with the challenges of workforce shortages. Please take this survey to provide input data for my research.

The survey is voluntary and anonymous, and takes about 10 minutes to complete.

I want to thank you in advance for your time.

CONTEXT OF ORGANISATION

1. Location:
2. Current number of employees:
3. Company size:
4. Industry:
5. Your position within the company:

WORKFORCE shortage

1. How often does your company suffer from a shortage of skilled workers?
 - All the time
 - Most of the time
 - Sometimes
 - Rarely
 - Never

2. How often do you use following methods for attracting new employees?

Method	Always	Most of the time	Sometimes	Rarely	Never
Newspaper advertisements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radio commercials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Television commercials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Web advertisements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Company newsletter advertisements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Croatian Employment Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Billboards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Temporary Employment Agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flyers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Social networks (Facebook, LinkedIn, ...)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personal networks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recruiting directly at high school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other media	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Which job positions are most difficult to fill?

Kliknite ili dodirnite ovdje da biste unijeli tekst.

4. How long does it generally take before a new employee becomes fully productive?

Kliknite ili dodirnite ovdje da biste unijeli tekst.

5. Which problems/drawbacks occur as a result of not having enough skilled workers?

Kliknite ili dodirnite ovdje da biste unijeli tekst.

6. To what extent do you agree that each of the following has a big impact on workforce scarcity in Croatia?

	Strongly agree	Agree	Nor agree nor disagree	Disagree	Strongly disagree
Raising demand and workload in the industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emigration of skilled workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Low wages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not enough students in technical high schools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. To what extent is each of the following statements correct for your company?

	STRONGLY AGREE	AGREE	NOR AGREE NOR DISAGREE	DISAGREE	STRONGLY DISAGREE
In last 2 years we had troubles finding skilled workers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The demand for our products/services has increased in last two years.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In next 18 months we plan major investments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Returns on those investments rely heavily on skilled workers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The employees are retiring faster than new ones can be recruited.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The number of vacancies due to growing production volumes is growing faster than number of employees we manage to employ.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There are enough workers on the market, but it is difficult to find workers with specific skillset we need.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is usual that our manufacturing workers work a lot of overtime hours.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Working conditions in the manufacturing have considerably improved in the past years.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of skilled workers forces us to reject new purchase orders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In the last 3 years we have lowered our selection standards for job candidates.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The process of hiring a worker lasts longer than it lasted 3 years ago.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We expect that in the next two years it will get easier to hire skilled workers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The machines and equipment are underused as consequence of worker shortage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In last 2 years, the average wage of skilled workers has increased more than average salary in Croatia.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of skilled workers presents the biggest limit for our further growth.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We are considering opening a new plant in a location with more skilled workers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have a written programme of training and education within our company.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
New employees normally need additional training in the company before they become productive.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
For some skilled positions we hire unskilled workers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. For the next 18 measures please indicate whether they apply to your company and if yes, how successfully?

	NOT APPLIED	PLANNED FOR NEXT YEAR	APPLIED, BUT WITHOUT MUCH SUCCESS	APPLIED, WITH A LOT OF SUCCESS
Increased recruiting effort (active advertising and searching for candidates)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reducing minimum qualifications for the job	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regular recruiting at local high schools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offering scholarships to students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Systematically improving company's image as an employer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Establishing training centres within the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Employing retired people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Giving one-time bonuses to newly employed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Raising salary for demanded jobs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Systematically improving working conditions in order to retain and attract new employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using temporary employment agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reorganizing processes with aim of employing unskilled workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using cooperating partners, independent subcontractors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using <i>crowdwork</i> where applicable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Substitution of labour with equipment and machines (automation, digitalization, robotics)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opening plants in locations with better workforce environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offering job-and-accommodation packages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improving the perception of manufacturing jobs' attractiveness in public	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mergers and Acquisitions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. To conclude, what would you recommend to the government, education system or other employers, how can they help tackle the problem of workforce shortages?

Kliknite ili dodirnite ovdje da biste unijeli tekst.

Thank you for Your contribution!

Appendix 2. p -values from Kruskal-Wallis test

Mark	Used strategy	p -value
S1	Increased recruiting effort (active job advertising)	0,855
S2	Systematically improving working conditions	0,821
S3	Systematically improving company's image as an employer	0,729
S4	Using cooperating partners, independent subcontractors	0,845
S5	Regular recruiting at local high schools	0,260
S6	Reducing minimum qualifications for the job	0,167
S7	Substitution of labour with equipment and machinery	0,036
S8	Raising salary for demanded jobs	0,198
S9	Improving the perception of manufacturing jobs' attractiveness	0,454
S10	Establishing training centres within the company	0,127
S11	Offering scholarships to students	0,482
S12	Reorganizing processes with aim of employing unskilled workers	0,633
S13	Giving one-time bonuses to newly employed	0,464
S14	Employing retired people	0,539
S15	Using temporary employment agencies	0,039
S16	Offering job-and-accommodation packages	0,668
S17	Opening plants in locations with better workforce environment	0,817
S18	Mergers and acquisitions	0,667
S19	Using crowdwork	0,805

Appendix 3. Interview structure

Company details

Interviewee function:

Current number of employees: 0-20 / 21 – 50 / 50-200 / 200-500 / >500

Company size: Micro / Small / Medium / Large enterprise

QUESTIONS / TOPICS:

1. **INDUSTRY AND MAIN BUSINESS ACTIVITY**

Could you, as a start, explain what the company does, what are its main activities?

2. **MARKET SITUATION**

How would you describe your current market situation? Do you get a lot of projects? Do you plan any investments? Are the company profits growing? Is the number of employees growing?

3. **RECRUITMENT AND TRAINING**

How does a recruitment process in your company work? Who is involved, who decides? How are candidates selected, how are they attracted? How do first days at work of a new employee look like?

4. **WORKER SHORTAGE**

Would you say that your company is experiencing worker shortage? People of which professions are most difficult to acquire? What are the consequences of worker shortage for your company?

5. **HOW CAN THEY REDUCE DEMAND FOR WORKERS**

Are there ways to reduce the labour demand in your industry?

6. **CAUSES AND SOLUTION IDEAS**

What would you name as main reasons for skill shortages in Croatia? Can you recommend any solutions?

7. **FUTURE SCENARIOS**

How do you see the future of the industry? What are some future scenarios regarding the worker problems?

Appendix 4. Interview transcripts

Čakovec, 9.7.2018.

Company details

Interviewee function:	Production manager
Current number of employees:	21 – 50
Company size:	Small enterprise

QUESTIONS / TOPICS:

1. INDUSTRY AND MAIN BUSINESS ACTIVITY

Main activity is designing, production and sales of central heating equipment. Most important products are heating water manifolds, which are produced in large batches and exported throughout the world. Production capacity is normally sold out for a whole year in advance, which makes it very easy to plan production and corresponding demand for labour.

2. MARKET SITUATION

Market situation is great at the moment, demand for products is very high. Orders have to be rejected because of capacity limits, which however also increases product prices. There are currently ongoing investments – a new production plant with new technologies is being built, funding supported by European funds. Number of employees is stagnating; the company is however obliged to increase the number of employees by the end of the year, as a condition to receive the European funding.

3. RECRUITMENT AND TRAINING

Planning labour demand, job advertisements, candidate selection and hiring decisions are all made by the owner of the company. A better coordination with production management in this field would definitely be beneficial. Jobs are advertised in newspapers, on the web and at Croatian Employment Service. Company web page is will in the future also be used for job advertising. Word to word recommendations from our existing employees are the most reliable source of candidates.

For the first few weeks, new employees are working with a mentor, before they start working independently. In those first weeks, the new employee is being assessed – after he shows his skill level, he is selected for a particular job in the company and wage level is completely defined.

4. WORKER SHORTAGE

Labour shortages are present which results in the inability to hire more workers. This causes more pressure on the existing employees, and rejecting of purchase orders. Of course if we reject too many orders, our customer has to find another solution and turns to

our competitors. Working overtime is avoided wherever possible. Some vacancies are filled with unskilled people, although the job requires a skilled worker. This causes, lower quality of the product, higher error and scrap rate in production. For some manufacturing technologies, we have only one skilled operator – and it will be extremely difficult to hire a new worker with this particular knowledge. Most sought after jobs are welders, turning machine operators and CNC operators.

5. HOW CAN THEY REDUCE DEMAND FOR WORKERS

Company policy is to prepare workers for working on two different jobs within the company, to allow flexibility. This is not always a good approach, as the workers are not equally competent to do both jobs.

6. CAUSES AND SOLUTION IDEAS

A few workers went to work abroad. There are enough workers on the market, but to convince them to join the company, it takes a higher pay check. The problem is proximity of Slovenia and Austria, where people can earn much more for doing the same type of work. In many companies in Međimurje, there is a lot of dissatisfaction among workers because of internal imbalances in wages. Newly employed get a higher wage for less skill and experience, just because the labour market is tight.

The problem is also the lack of knowledge transfer between experienced workers and young people. The companies are not organized to allow time for this knowledge transfer, as employees work all the time and learn only by doing, which means they are rediscovering existing knowledge themselves. Students leaving high schools are not skilled enough to be standalone workers and need additional training and supervision for several months before becoming productive.

7. FUTURE SCENARIOS

Personal opinion - there is no labour shortage in Croatia. The problem is that people are not willing to work for the given wage level. If the wages increased, more workers will want to work and existing employees will be better motivated. People who are not working, or are working in informal economy will be better motivated to get a formal job. This situation will improve only if worker wages increase, and people stop emigrating for a better job. If we could get them to start coming back to Croatia, that would be something.

Čakovec, 9.7.2018.

Company details

Interviewee function:	CEO
Current number of employees:	21 – 50 (43)
Company size:	Small enterprise

QUESTIONS / TOPICS:

1. INDUSTRY AND MAIN BUSINESS ACTIVITY

The company provides a support to construction industry by supplying buildings with electro material and installing these on site. Focus is on decorative lightning for shopping malls. Work is normally done project by project, at a construction site. In addition, the company has a small workshop for production of necessary electro cabinets and assemblies.

2. MARKET SITUATION

Market situation is excellent at the moment, a there is great demand for company's products and services, and the sales prices are relatively high. The purchase orders even have to be rejected because the company does not have enough capacity to deliver. Mr. Radek notes that the very same situation is in whole Croatian construction industry.

3. RECRUITMENT AND TRAINING

Labour demand analysis, job advertising, candidate selections and employment decisions are all carried out by the CEO/owner of the company. First a request for workers is posted to Croatian Employment Service and the flyers are normally handed out at local high schools near school end. New workers are first taken for a trial period, a foreman instructs them about the basics and they learn further with experience. The selection criteria are considerably lower since there are literally no electricians available from CES in the Međimurje county. Even the workers who are not qualified for the job are employed if they show a good attitude and wiliness to learn.

4. WORKER SHORTAGE

The company has to reject further orders. Lack of workers poses most significant constraint for growth of the company, as it has the logistics and infrastructure to support twice as many jobs.

5. HOW CAN THEY REDUCE DEMAND FOR WORKERS

The company cannot use automation to reduce the demand for workers, since a lot of work is done on site, and requires high degree of skill and flexibility among workers. When on a site abroad, they sometimes use temporary hire local workforce to support work on a project.

6. CAUSES AND SOLUTION IDEAS

First of all, to help employers the government should reduce taxes and contributions burdening the real economy. It will enable the employers to give higher wages to employees. The state problems are also slow justice system and taxation system which is not equal for everyone, but is susceptible to the interpretation of local taxation office. Quotas for technical high schools are too low compared to what is needed from the industry, whereas some of the high schools produce a lot of non-employable people (those who are currently widely available and not needed by companies). The problem is also that craft professions have a rather negative image in the public, as lower-class jobs.

7. FUTURE SCENARIOS

If the government does not decide to make a big shift in taxation, justice and education, the labour market situation will continue to worsen. Employers are doing everything they can. One of the pessimistic future scenarios is that people will live in Croatia, but drive to work in Slovenia or Austria, where their incomes are almost doubled, they earn better pensions, and the companies are better organized. Recommendations to young people: don't do things, just because everyone else is doing them, find your own way. I really hope that at least some of you will start a company here in Croatia and employ people. Persistence is what matters – when they kick you out through the door, you climb back in through a window.

Čakovec, 11.7.2018.

Company details

Interviewee function:	Board Chairman
Current number of employees:	>500
Company size:	Large enterprise

QUESTIONS / TOPICS:

1. INDUSTRY AND MAIN BUSINESS ACTIVITY

There are two main business activities: Manufacturing of machines and machine parts for mining and construction industries and wholesales of construction materials. Manufacturing is oriented towards exporting products to European countries.

2. MARKET SITUATION

All of our main sectors (mining and construction) are booming at the moment and demand for our services is very high. Both our turnover and our profits are continually growing in the last 8 years. We are very actively trying to increase the number of workers, but since many of current employees are leaving, total number of workers is stagnating. This means that increased turnover comes from better productivity and better deals with our customers. Most limiting factor for growth is the lack of skilled workers. We have decreased investment activity because lacking workers. We could buy new machines, produce and sell more if we had enough workers.

3. RECRUITMENT AND TRAINING

Labour demand planning, selection of candidates and salary negotiations are made by production manager and foremen, but a final approval must be given from a board member. The company uses all available media to advertise job positions, because it needs as many workers as we can get. Back in 2013 we have easily recruited 100 people when the demand for our services increased. In 2018, we are struggling to increase the number by ten. We get no candidates from the CES no more, as all of the people available and willing to work are already working. Job advertisements are put in the newspaper, on the radio, on billboards, television, our web page, in social media, brochures are handed out at high schools, and so on. Many workers are employed based on personal recommendations of our employees. Existing employees are encouraged to find additional workers and convince them to join the company, and receive a one-time bonus for each new employee. We offer scholarships to students, which is mutually beneficial for both the students and us. Supported students have their apprenticeships in our company. We train them, assess them, and when they finish vocational school, we employ them. In May and June, company tours are organized for interested students. There is a close collaboration with local Adult education centre - we financially support people who want to be trained for working in

metal-processing industry. All these approaches add up and produce results, yet we still cannot get enough people, simply because there are none available.

4. **WORKER SHORTAGE**

This causes increased workload of our existing employees. We need much longer time between order and delivery, because our production capacity is full. Some customers cannot accept our longer lead times, and we have to make a tough choice – to delay delivery to another customer, or to reject new purchase orders. They are even disappointed with lack of flexibility in our lead times and volume. All of those is negatively affecting the reputation of the company among customers. Some machines are not used to their full potential because there are not enough workers to operate them. Workers which are not skilled enough for their job tend to produce lower quality outputs.

5. **HOW CAN THEY REDUCE DEMAND FOR WORKERS**

They have opened a new production plant in a location with more workers and see this as a very successful approach to addressing scarce labour in Međimurje. Acquisition of existing companies in those areas was also considered as a possible approach.

We to use subcontractors to extend our production capacity, which has proven as a successful method for addressing spikes in demand for our services. Building a long-term mutual partnership is crucial. However, at the moment almost all our subcontractors are operating at full capacity and it is difficult to count on them for additional volume.

We sometimes do employ people who are not qualified for a particular position, because we must. We train them to understand the processes and perform better. The performance of those workers is rather low at the beginning, because they have a high scrap rate, and unintentionally cause damage to tools or machines. The success of this approach is questionable, because a lot of time and money is put into training. Some of the workers are not interested in learning. Other want to learn but then leave the company.

6. **CAUSES AND SOLUTION IDEAS**

One of the problems is that people are not satisfied with general atmosphere in Croatia. They are disappointed with our justice, health and social systems. People do not see any progress in the country. That is why they leave, higher wage is not the main reason. We are constantly working on our company image. We are proud to be a socially responsible company, helping the local community.

The government should reduce taxation of salaries for example. In Austria, companies have the option to pay out 13th and 14th salary in year, which are taxed at a very low rate. Croatia can give only 2500 kn per year as untaxed payment. The government could also increase immigration quota for demanded workers.

7. **FUTURE SCENARIOS**

The image of manufacturing jobs is improving in recent years. Technical high school in Čakovec is increasing their quotas to adapt to needs of the labour market. They are full nonetheless, because more and more students want to pursue career in manufacturing. We also see a lot of potential in including women in jobs which were traditionally seen as male

jobs e.g. welders. Some companies will have to downsize because lack of workers will limit their production and sales capacity.

Čakovec, 11.7.2018.

Company details

Interviewee function:	CEO
Current number of employees:	1-20
Company size:	Micro enterprise

QUESTIONS / TOPICS:

1. INDUSTRY AND MAIN BUSINESS ACTIVITY

Cooled bars for restaurants, clubs and cafes. The products are custom designed and manufactured. It is a niche market which enables sufficiently high profit margins for such prototype production.

2. MARKET SITUATION

Most of the time we operate on local market and sometimes in Slovenia. Business is not booming, but there is continuously enough demand for our products.

3. RECRUITMENT AND TRAINING

As in most small companies, the owner takes care of job advertisements, candidate selection and hiring decisions. Job are advertised on the CES and using flyers on local grounds. In the last 2 years, it takes an extremely long time to fill a vacancy.

4. WORKER SHORTAGE

Yes. It is difficult to find people willing to work. But if we cannot avoid labour shortage, we reduce its symptoms. We simply have to lower our sales volume to match the capacity we can efficiently produce. We get to choose which orders we accept and which we reject. Lack of workers causes however long lead times, which is not always accepted by the customer. If we miss deadlines, company reputation suffers. We are a small company which cannot offer a high wage, but we offer excellent working atmosphere and a job without stress, which is not usual among other employers in the area. The biggest problem is that only one man does the welding – if he is absent, production stops. If he decided to leave the company, the consequences would be devastating for the company, as hiring a new welder to do the job would take a lot of time,

5. HOW CAN THEY REDUCE DEMAND FOR WORKERS

Since we produce custom-made catering equipment, automation is simply not an option. Each product is unique and hand made. It is a labour intensive business model.

6. CAUSES AND SOLUTION IDEAS

Manufacturing jobs are seen as dirty and exhausting. They are not the first choice for most students entering secondary education. Every parents expects their child to become a white collar worker nowadays.

At the moment, it is “popular” to emigrate and work (for at least a few months) abroad. Common approach among young workers is to work in Austria or Germany for a year, buy a luxurious car, then come back home.

Regarding the middle-aged, the problem is that Croatians working in Austria get much higher pensions there than here. All in all, pensions in Croatia are modest. That is why people accept taking informal jobs or getting a part of their wage in cash, unreported and untaxed. Benefits of having a formal job are modest.

7. FUTURE SCENARIOS

Companies with lower profit margins will soon be eradicated, because they will be unable to pay high enough wages to their employees. The employees will leave and go working for better companies. They are also becoming more sensitive to their working environment and non-monetary benefits. Labour shortage is present, yes, but is not severe at all. It requires some adjustments from employers. It is a new thing here. Croatia has never had tight labour market before, and neither companies nor the government know what to do. And that is why they expect action one from another.

Čakovec, 16.7.2018.

Company details

Interviewee function:	Project Coordinator
Current number of employees:	50-200
Company size:	Medium enterprise

QUESTIONS / TOPICS:

1. INDUSTRY AND MAIN BUSINESS ACTIVITY

The company designs customized interior for businesses and shopping mall stores, manufactures the furniture and installs it on-site. All stages of value chain from the idea to final solution are under one roof.

2. MARKET SITUATION

The company is constantly growing in last 10 years. It presents a brand of style and quality in their industry. It covers all south-eastern Europe countries, but also exports a lot to Germany, Denmark, United Kingdom, and even Kuwait at the moment.

It has grown from about 120 employees 3 years ago to 170 employees now, a rather quick growth. We are seen as one of the best employers in this area, so most of the time, we get to pick our employees. We are constantly investing in new manufacturing technologies, to increase the volume we can produce and make products of higher quality.

Since we have whole vertical integration, from designing and consulting about object interior, to complete production, assembly, electro assembly and on-site work, we employ both college-educated workers (architects, designers, engineers), as well as a lot of manufacturing workers.

3. RECRUITMENT AND TRAINING

There is a lot of young people in the company, the communication is great and we love working here. We have a good collaboration with technical high school in Čakovec whose students visit our company each year and we work with them on educational projects. Even students from local primary school come to our company, and we prepare workshops where children can play and learn.

We also take part in job fairs within the county. Constantly working on our brand for the past 10 years is yielding results. We are not actively searching for employees or advertising job postings at the moment, but are open for accepting people which are willing to join our team, if they show skill and integrity. A lot of students seek employment in our company upon graduation and we employ some of them each year. When they finish vocational school, they are generally not ready to work and need additional training. This is because schools insist too much on general education, instead of focusing on craft skills.

The owner of the company makes the selection and hiring decisions. Wages are constantly rising, and a lot of benefits are received. Retention rate is very high, although some

employees quit the company to work in Austria. Working conditions here have improved years ago, and most other employers have to put in a lot of effort to keep up with us.

4. **WORKER SHORTAGE**

The company does not feel any consequences of labour shortages at the moment, although it may affect further growth in the future.

5. **HOW CAN THEY REDUCE DEMAND FOR WORKERS**

We have both prototype and batch production. Production of parts does not require a lot of labour; assembling, on the other hand, does. Since cost benefits are one of the drivers in the company, each product has to be designed with the production cost in mind. Production is automated where feasible and some parts and assemblies are manufactured by our partners. This enables us to quickly produce a bigger volume when we have ongoing projects.

6. **CAUSES AND SOLUTION IDEAS**

There are many different forces contributing to labour shortages. Manufacturing jobs do not give young people the status they want. Some of the younger workers go to Austria because of higher salaries. Middle aged people think also about the pension income, and choose to work in Austria to earn better pensions. If the pensions in Croatia were higher, this will be prevented. But not everything is about the money – good working environment encourages people to stay.

7. **FUTURE SCENARIOS**

We see that we might too feel labour shortages in next year if current trends continue. Ten years ago, it was impossible to find a job. Now it is difficult to find workers. The situation has changed a lot. It is difficult to forecast what comes next.