The Outsourced Facility Service Industry in Austria and its Neighbouring Countries and the Impact of Digitalisation on it

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Abstract

With more than 14 million employees the FS industry is the 3rd largest industry in the EU. Research shows that the outsourced Facility Services industry is growing faster than business economy as a whole (Redlein & Stopajnik 2017) in the EU and in Germany. This article analyses the situation for Austria and its neighbouring countries.

It is also unclear how many employees in FS will be affected by digitalization in Austria. The number of employees is the basis to estimate the impact of digitalisation on the FS industry in Austria. Knowing how many people will be affected by automation helps governments and industry to take actions to prevent mass-unemployment and to make sure companies can find well-trained employees.

The analysis on the development of the FS industry in Austria and its neighbouring countries is based on data from Eurostat. To estimate the impact of digitalisation literature research is conduced, existing studies are analysed and transferred to the FS industry. Results show that in Germany, Austria and in Slovenia the number of employees in FS increased in relation to non-financial business economy. Only in Hungary a constant decrease compared to non-financial business economy since 2009 is visible. An analysis of the impact of digitalization on different tasks, occupations and industries shows, that the FS industry will be more affected than other industries.

Keywords: Digitalisation, Automation, Facility Services, Employment

1. Introduction

Enormous changes due to the ongoing automation and digitalization are foreseen for the labor market. The changes will vary among the different industries. It is not yet clear which industry will be affected to which extend (Bowles 2014). Studies predict different scenarios, but all studies agree that the world of employment is not going to stay the same. So also shifts ins skills are necessary (World Economic Forum 2016). This also accounts for the Facility Service (FS) industry. In order to prepare for future, to make sure that the skills of employees match the demand of the companies it is necessary to analyse how many people will be affected by those changes and how those changes look like.

It is already known that the outsourced Facility Service industry is huge in the EU: The outsourced FS industry counts more than 14 million people in the EU (Redlein & Stopajnik 2017) and the industry is increasing in relation to business-economy in the EU and in Germany. It is not yet clear if the FS industry is also growing in Austria and its neighbouring countries. Therefore, the research questions are:

- How did the outsourced Facility Service Industry develop in Austria and its neighbouring countries in terms of employees?
- How many employees in FS will be affected by digitalisation in Austria?

There are different reasons why the development of the FS industry has not been analysed in many countries and why the impact of digitalisation on this industry is not clear. The main reason is that the FS industry is not presented separately in official reports:

Structural statistics by the European Commission and national statistical institutions in the EU use NACE Rev.2, the statistical classification of economic activities in the European Community for their reports (Statistik Austria 2016). The FS industry is not presented as a separate industry in NACE. In this classification there is only the position “Combined facilities support activities” - in the German NACE-version this position is called “Hausmeisterdienste” meaning janitorial services. This position doesn’t even include typical FS such as general interior cleaning services for buildings. The provision of single services e.g. heating can be found in different classes. (European Commission/Eurostat 2008). So the position “Combined facility support services” does not present the total FS industry. As most studies analysing the labor market and digitalisation are based on the classification of NACE, the total FS industry is also not included in those reports.

FS cover many different services. The opinions which services really belong to FS differ. (Thomzik et al. 2010) FS are defined as "support provision to the primary activities of an organization, delivered by an internal or external provider" (British Standards 2007). Starting in 2002 a European Norm for Facility Management (EN 15221) was created to enhance an EU-wide understanding of FS. This norm defines Facility Management and Services (Jensen 2010, Österreichisches Normungsinstitut 2012). The EN 15221-4:2011 by the technical Committee CEN/TC 348 "Facility Management" includes a list of services and activities to be considered FS.

The underlying definition and understanding of Facility Services in this paper is strictly based on this norm. The services that are considered FS according to the EN-15221-4:2011 are matched with the detailed industries of the structural business statistics by the European Commission to estimate the numbers of employees in FS for each year. So a valid measure is provided, that allows to compare the FS industry across countries and to other industries. Based on this approach the development of the FS industry in terms of employees in Austria and its neighbouring countries is analysed. The results consist of the outsourced services for all types of buildings and infrastructure (e.g. business buildings, private housing). The development from 2008 until 2014 is analysed, as long as the data base is sufficient.

2. Method

The method is structured into two parts: First the development of the FS industry in Austria and neighbouring countries is estimated. Then the impact of digitalisation is determined.

Development of the FS industry:

The size of the FS industry for the EU and the four largest national economies in Europe (Germany, United Kingdom, France, Italy) has already been assessed and its development has been presented (Redlein & Stopajnik 2017). The same method is applied for Austria and its neighbouring countries, because this makes results comparable within the whole EU and the method has been elaborated exactly for that purpose.

First the services that are considered FS according to the EN-15221-4:2011 are matched with the detailed industries of NACE Rev.2. Then the relevant industries for FS, namely the relevant industries for the usage and operation of buildings are selected from structural statistics by the European Commission on the most detailed level. (European Commission/Eurostat last modified 2017). The numbers of employees for FS are summed up and presented as a

percentage of total non-financial business-economy to make trans-national comparisons possible. The results for the EU and Austria and its neighbouring countries are presented as long as the data base is sufficient.

Structural business statistics use the European-wide statistical classification of economic activities in the European Community (NACE Rev.2) (European Commission/Eurostat 2008). They are published online by the European Commission (European Commission/Eurostat last modified 2017) and comprise the NACE sectors B-N and S95. The European Commission uses the term business economy for those sectors. Agriculture and personal services are not part of it. Structural business statistics present structure, behaviour and performance of economic activities on the most detailed level of the statistical classification. Those statistics provide huge amounts of data and ratios such as turnover, value added at factor cost, employees, investment rate. The data was collected directly from enterprises by National Statistical Institutions. (European Commision/Eurostat last modified 2015). The data has already been checked before for its suitability, plausibility and validity. This was mainly done by calculating ratios such as value added per employee and analysing outliers.

The financial sector (K) is recorded from 2013 onwards. Even from 2013 onwards data is very often missing in different countries. This provokes breaks in time series and destroys reliable comparisons. Therefore, the financial sector is excluded in this analysis. Also the European Commission presents the total of business economy without the financial sector. (European Commission/Eurostat last modified 2018)

Impact of digitalisation:

In a second step an intensive literature research on the probabilities of automation is conducted. Then the most important studies are selected and, if possible, applied on the FS industry: The different industries for which probabilities of automation have been determined are matched with the services that are relevant for Facility Services. This way the probability of digitalisation for FS is estimated.

3. The Development of the FS industry - Results

The following graphics show the numbers of employees in FS and in total non-financial business economy from 2008 to 2014. The selected countries are Austria and its neighbouring countries as long as the data base is sufficient. In Switzerland and Czech Republic more than 8 values for services that are relevant for FS were missing in all years, therefore those two

countries are excluded. France was added because it is one of the three biggest economies in the EU and that makes a comparison interesting. It must be noted that the number of employees includes part-time and full-time workers.

The first table shows a comparison of the number of employees in different industries in 2014. Slovenia is excluded because the data base for 2014 was not sufficient yet. The table shows that in the EU, in Germany, Italy, Austria and Hungary the FS industry even takes place 3. The largest industries are Manufacturing and Wholesale and Retail Trade.

	EU28	DE	FR	IT	AT	HU	SK
Manufacturing	29.900.000	7.269.135	3.014.251	3.654.887	620.993	678.247	467.686
Wholesale and retail trade; repair of motor vehicles and	32.680.601	6.139.638	3.455.212	3.302.311	651.401	551.960	330.951
FS in total	**14.438.876**	**3.353.395**	**1.773.693**	**1.496.379**	**250.065**	**260.416**	**109.964**
Administrative and support service activities	14.195.840	3.175.663	1.975.927	1.122.393	219.660	207.932	81.566
Professional, scientific and technical activities	12.121.100	2.452.208	1.354.292	1.186.817	236.342	221.782	125.398
Construction	12.555.252	2.202.152	1.813.280	1.356.571	288.074	194.532	146.448
Transportation and storage	10.491.057	2.103.986	1.289.522	1.073.322	194.132	226.351	99.329
Accommodation and food service activities	10.807.897	2.085.047	1.027.310	1.295.869	291.003	127.646	56.465
Information and communication	6.315.880	1.180.249	840.487	531.567	108.628	118.359	54.091
Real estate activities	2.841.981	614.919	316.177	287.508	50.207	65.290	27.363
Electricity, gas, steam and air conditioning supply	1.230.152	228.179	190.297	88.476	29.297	24.782	18.104
Water supply; sewerage, waste management and remed	1.480.000	227.396	166.854	183.011	20.314	40.747	21.418
Mining and quarrying	566.936	60.841	21.523	31.222	6.265	4.298	7.137
Repair of computers and personal and household goods	414.682	41.710	83.729	44.641	4.168	10.773	3.775
Total number of employees	**135.601.378**	**27.781.123**	**15.548.861**	**14.158.595**	**2.720.484**	**2.472.699**	**1.439.731**

Table 1: Number of employees in different industries in 2014, own calculation on the base of annual detailed enterprise statistics (European Commission/Eurostat last modified 2017)

The first graphic shows the development of the FS industry in the selected countries from 2008 till 2014. Employees in FS are presented as a percentage of all employees in the non-financial business economy. This relation shows if the FS industry developed as the rest of business economy. Due to missing values the time series of the EU, France and Slovenia are not complete. The dip in the time series in France in 2012 and 2013 is also due to missing values. In France in those two years there are approximately 240.000 employees in FS missing. Therefore, this dip cannot be interpreted. In Slovenia data is not always complete but there we are talking about approximately 20 to 320 employees each year, this doesn't change the result too much. In Slovakia there is data missing in 2008 and in 2009 but also only about 180 employees, this number is also neglectable.

In Germany, Italy, Austria and Slovenia the percentage of employees in FS is increasing compared to the whole business economy year by year. In the EU and in France a slight increase is visible. In Hungary and Slovakia, there is an increase in 2009 but then the percentage is decreasing. In most countries it even looks like there is a little peak in 2009. In 2009 there was the economic crisis, this could be an indication that the FS industry reacted more slowly to the

economic crisis than the rest of business economy. It is also possible that during the crisis companies outsourced Facility Services and employees changed from in-house FS departments to external FS providers.

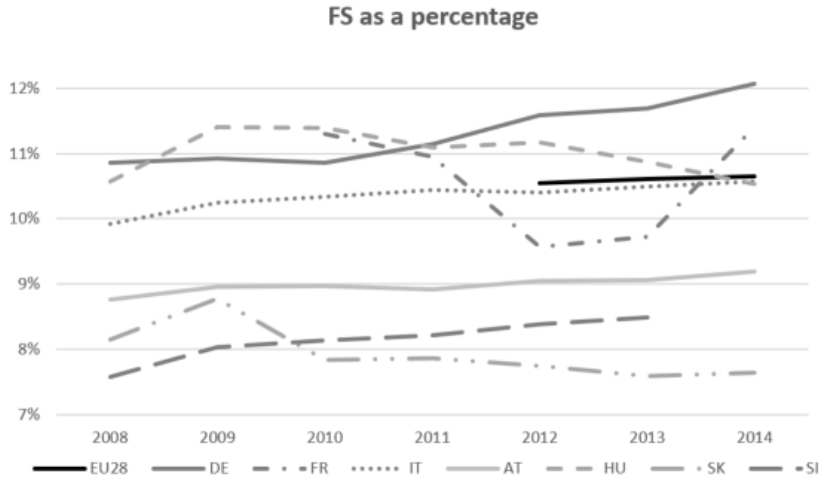

Figure 1: Employees in FS in total as a percentage of employees of NACE B-N, S95, excl. K, own calculation on the base of annual detailed enterprise statistics (European Commission/Eurostat last modified 2017)

To get a deeper insight into the development the total numbers of employees are observed: The next graphic shows the employees in FS in total. In Germany and Austria there are each year more and more people working in the outsourced FS industry. Again in France the dip in the time series is due to missing values and the years 2012 and 2013 cannot be interpreted. However, from 2011 to 2014 a small upwards trend is visible. The only countries that really show decreases are Hungary and Italy. Slovakia has a huge increase from 2009 to 2010 but in 2011 and 2012 the numbers go back a bit. In 2014 also Hungary and Slovakia recover again. Slovenia is quite stable.

This graphic shows that we are talking about huge numbers of employees although the increase in percentages seems minimal. E.g. From 2013 to 2014 in Germany there are 260,000 employees more in FS, in Austria there are 5,000 more, in Slovakia there are 3,000 more and in Italy there are 16,000 people less than in 2013. There is no differentiation between part-time and full-time employees.

Due to huge differences in the sizes of the countries the biggest economies Germany, France and Italy are described by the right Y-axis, and the other countries by the left.

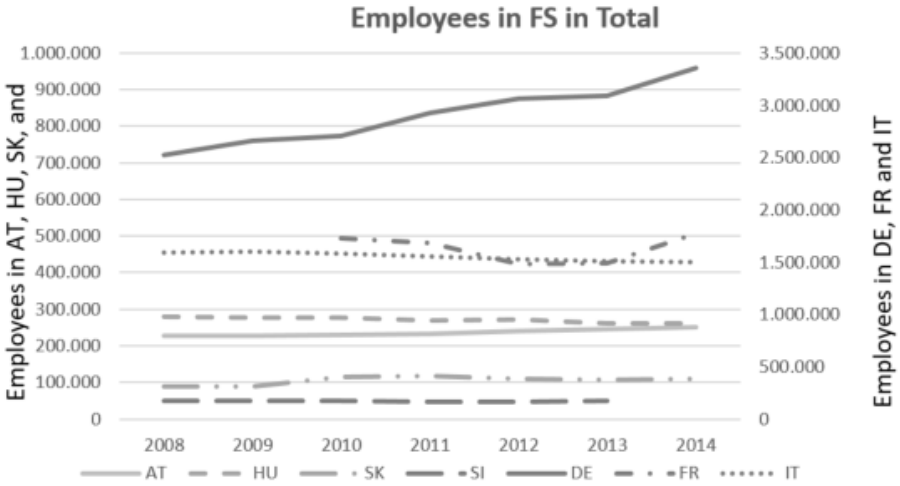

Figure 2: Number of employees, FS in total, own calculation on the base of annual detailed enterprise statistics (European Commission/Eurostat last modified 2017)

A comparison to the total non-financial business completes the picture. The crisis from 2009 shows a decline of the number of employees in all countries except for Germany. Besides that, total business economy shows the same trend as the FS industry: While in Italy and Hungary economy is going down, the other countries show (mostly) positive developments. Only Slovenia is also decreasing very slightly. The reason for the upwards trend in the first graphic in Italy is the fact that in relation to total business economy the FS industry decreased less. 2014 again is the year for recovery except for Italy. Slovakia shows the same huge increase after the economic crisis in 2009. According to the Institute of Labour Economics the drivers of recovery in Slovakia were exports and investment (Fidrmuc et al. 2013).

What is interesting to see is that the development of Italy-France and Austria-Hungary. Total non-financial business economy in Austria and Hungary was approx. in 2008 the same size but Austria keeps growing and Hungary shrinks until 2014. The number of employees in non-financial business economy in France and Italy were approx. the same in 2010 but since then they are drifting apart more and more.

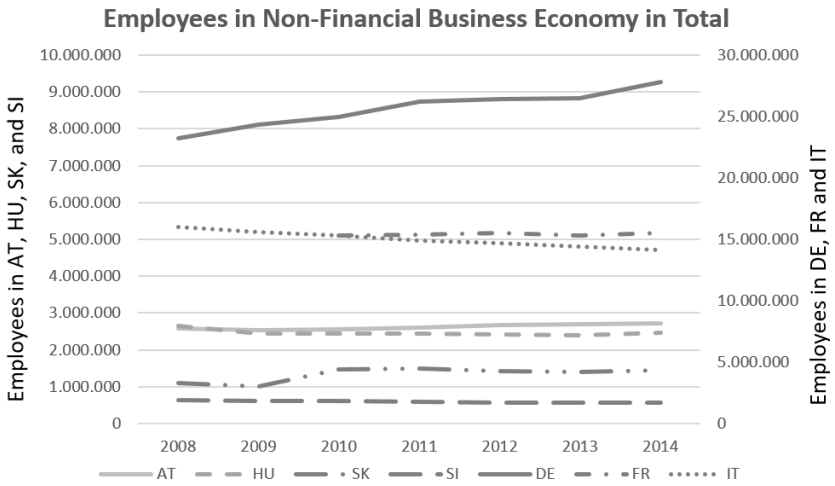

Figure 3: Number of employees, non-financial business economy (NACE B-N, S95, excl. K), own calculation on the base of annual detailed enterprise statistics (European Commission/Eurostat last modified 2017)

4. Impact of Digitalization on FS

Estimations on employment change due to digitalisation are everywhere. The world economic forum published their predictions in „The Future of Jobs" in January 2016. They estimate that until 2020 7,1 million jobs will be lost and 2 million jobs will be created in the countries covered by the report (15 major developed and emerging economies in the world, including France, Italy, Germany and the United Kingdom). They also predict that office and administrative workers will be affected most. The newly created jobs will be found in computer- and mathematical-, architecture- and engineering-related fields. The most important skills in 2020 are complex problem solving, followed by critical thinking and creativity. Emotional intelligence and cognitive flexibility also gain importance. Different tasks will get less important: Coordination with others, people management, quality control and active listening. The report also states that core skills will change. In Italy 48% will change, in France 38% of core skills will change, in Germany 39% and in the UK 28%. (World Economic Forum 2016)

Probably the most famous study is "The future of employment: How susceptible are jobs to computerisation" by Frey and Osborne (2013). It is the basis for most current studies. Frey and Osborne determined the probabilities of computerization for 702 occupations in the US. Those estimations were based on the technological progress in machine learning and mobile robotics. For the US they estimated that across all industries 47% of jobs might be substituted by computers. They also stated that low-wage and low-skills jobs were more threatened than others. An analysis of the probabilities of automation on different occupations suggests that FS activities are at very high risk: Installation, maintenance, repair work has a 50% probability to

be automatized, the probability for janitors and cleaners is 66% and the estimation for first-line supervisors of housekeeping and janitorial workers is 94%. (Frey & Osborne 2013)

Bowles transferred this study to the EU (2014). As Frey and Osborne used the Standard Occupational Classification (SOC) for the US, a translation to a system used in the EU, International Standard Classification of Occupations (ISCO) was essential. Bowles estimated that 54% of jobs in the EU are at risk to be automatized. (Bowles 2014)

Brzeski and Burk applied this study also on Germany (2015). They had to make adaptions because of different classification systems and restricted availability of labor market data. They estimated that 59% of jobs are at risk in Germany. Most threatened are administrative activities like secretaries, followed by unskilled workers. (Brzeski & Burk 2015)

More recent studies show completely different numbers. They are still based on the research of Frey and Osborne but they assume that not complete occupations will be automized but only tasks. Those studies also agree that routine-tasks will be affected most. For OECD countries those studies estimate that only 9% of jobs are automatable. In the EU percentages range between 6% and 12% for the different countries in this study. For Austria and Germany 12% of jobs are at risk. Influencing factors that might change the situation have not been included in those studies. Those factors could be scenarios such as new technologies evolve into a mass product and get cheaper, production of this product could lead to more jobs or not (e.g. be off-shored). Another scenario is that employees find niches. (Arntz et al 2016, Bonin et al. 2015)

Nagl et al. based their study on digitalisation in Austria on Bonin et al.'s study which was based on Frey and Osborne. They came to the conclusion that 9% of jobs in Austria were at highest risk. As many studies before did, they also analysed the distribution of the estimated probabilities of automation in the different industries and published the probabilities for jobs at highest risk (more than 70%) and medium risk (30%-70%) per industry. The classification of industries is based on the ISIC System (International Standard Industrial Classification) which can be very well compared to NACE. (Nagl et al. 2017)

Nagl et al. did not use the industry structure on the most detailed level, but still implications for the FS industry can be derived. Our own calculation shows that approx. 40,000 employees in FS in Austria are in the highest risk category in 2014. The jobs of 200,000 employees in FS are at medium risk. This means that in FS 16% of employees have a high-risk-probability of automation compared to 9% in the whole economy. This shows that FS are particularly threatened.

By using smart technologies information on usage and condition of buildings can be analysed. The usage of sensors and robotics increases. Of course FS providers are aware of those changes and prepare. E.g. Granderath from ISS Germany explains that sensors got cheaper in the past years consequently international FS-companies get ready to use this technology. They have to stay up-to-date and provide modern services for customers. They also invest, e.g. in sensoring for buildings. Big-Data together with Sensors have a high potential and could transform FM completely. Companies already use intelligent systems and according to Granderath more employees, who are able to handle those systems, are needed in future. (Granderath & Bilski-Neumann 2016)

The WIFO and BMVIT 2017 developed different scenarios for digitalisation in Austria in future and defined success factors: The development of new products and services is necessary and the education of the population and employees is essential. This means that schools have to teach digital competences, companies need to train their employees and include them in the process of change and SMEs need to be supported to make employee-training possible. Furthermore, it has to be taken into consideration that the human ability of (re)-acting according to a situation and making small adaptions is not there anymore. (Dinges et al. 2017)

5. Conclusion

The outsourced FS industry counts more than 14 million people in the EU and takes place 3 compared to the other industries of non-financial business economy. An analysis of the development shows that overall in the EU, in Germany, in France, in Austria and in Slovenia the number of employees in the FS industry has increased in relation to non-financial business economy. Only in Hungary there has been a slight decrease since 2010. The total numbers of employees in FS have increased in Germany, France and Austria. In general, the FS industry developed even better than the rest of non-financial business-economy. Only the reaction to the economic crisis in 2009 was less strong and partly retarded.

It is not possible to say how large the impact of digitalization on this development has already been or if parts of this evolution have been provoked by digitalisation. However, many different studies on digitalisation predict that jobs will be (partly) lost. There are great variations in estimations. For the EU the predictions range between 6-12% (Arntz et al. 2016) to 54% (Bowles 2014). For Austria the probabilities of automation lie between 9% (Nagl et al. 2017) and 54%. A detailed look at the different industries shows that the FS industry will be affected strongly.

As the WIFO and BMVIT stated, it is absolutely necessary to train employees. First of all this can help prevent mass-unemployment and second well-trained people are needed to create new products and services and companies need skilled employees. To succeed companies and governments have to drive innovation forward and make trainings possible. Employees need openness and willingness for life-long-learning.

Concerning this study, it must be noted that services, which are made in house, are excluded and that most services around buildings and infrastructure cannot be off-shored. Which means that even more employees are working in this field and might be affected by digitalisation. This makes the topic of employee-training even more important.

There are options for further research in this field. Concerning the development of the FS industry the structure of employment in the FS industry could be analysed more detailed and the share of inhouse FS employees would be interesting. Regarding digitalization it would be interesting to analyse the state of automation in the different countries and to do more research on the actual application of different technologies in FS.

References:

Arntz, M., Gregory, T., Zierahn U. (2016): The risk of automation for Jobs in OECD Countries: A comparative Analysis. OECD Social, Employment and Migration Working Papers, No 189, OECD Publishing, Paris. Available at: https://www.researchgate.net/profile/Terry_Gregory/publication/303311529_The_Risk_of_Automation_for_Jobs_in_OECD_Countries_A_Comparative_Analysis/links/573c6c2708ae298602e58360/The-Risk-of-Automation-for-Jobs-in-OECD-Countries-A-Comparative-Analysis.pdf (accessed 13.11.2017)

Bonin, H., Gregory, T., Zierahn, U. (2015): Übertragung der Studie von Frey/Osbourne (2013) auf Deutschland. ENDBERICHT Kurzexpertise Nr. 57 an das Bundesministerium für Arbeit und Soziales, Zentrum für europäische Wirtschaftsforschung GmbH, Mannheim. Available at: ftp://ftp.zew.de/pub/zew-docs/gutachten/Kurzexpertise_BMAS_ZEW2015.pdf, (accessed 13.11.2017)

Bowles, J. (2014): The computerisation of European jobs. Chart of the Week: 54% of EU jobs at risk of computerisation, Bruegel. available at http://bruegel.org/2014/07/the-computerisation-of-european-jobs/ and http://bruegel.org/2014/07/chart-of-the-week-54-of-eu-jobs-at-risk-of-computerisation/ (accessed 7. February 2017)

British Standards (2007): BS EN 15221-1:2006, Facility Management Part 1: Terms and Definitions, London, UK.

Brzeski, C., Burk I. (2015): Die Roboter kommen. In: Economic Research – April 2015, ING-DiBa. available at https://www.ing-diba.de/pdf/ueber-uns/presse/publikationen/ing-diba-economic-research-die-roboter-kommen.pdf, (accessed 7 February 2017)

Dinges, M., Leitner, K.-H., Dachs, B., Rhomberg, W., Wepner, B., Bock-Schappelwein, J., Fuchs, S., Horvath, T., Hold, P., Schmid, A. (2017): Beschäftigung und Industrie 4.0.: Technologischer Wandel und die Zukunft des Arbeitsmarktes, Bundesministerium für Verkehr, Innovation und Technologie, AIT Austrian Institute of Technology, WIFO, Fraunhofer Austria Research GmbH, BMVIT, Wien.

European Commission/Eurostat (last modified 2018): Jährliche Unternehmensstatistiken für besondere Tätigkeitsaggregate (NACE Rev. 2), available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_sca_r2&lang=de, abgerufen am 3.5.2018)

European Commission/Eurostat (last modified 2017): Detaillierte jährliche Unternehmensstatistiken für das Baugewerbe (NACE Rev. 2, F), Detaillierte jährliche Unternehmensstatistik für den Handel (NACE Rev. 2, G), Detaillierte jährliche Unternehmensstatistik für Dienstleistungen (NACE Rev. 2, H-N und S95), Detaillierte jährliche Unternehmensstatistiken für die Industrie (NACE Rev. 2, B-E), in structural business statistics (sbs), available at: http://ec.europa.eu/eurostat/search?p_auth=vsrRef94&p_p_id=estatsearchportlet_WAR_estatsearchportlet&p_p_lifecycle=1&p_p_state=maximized&p_p_mode=view&_estatsearchportlet_WAR_estatsearchportlet_action=search&text=Detaillierte+j%C3%A4hrliche+Unternehmensstatistik (accessed 1. June 2017).

European Commission/Eurostat (last modified 2015): Metadata in Euro SDMX Metadata Structure (ESMS) in Structural business statistics (sbs). Available at: http://ec.europa.eu/eurostat/cache/metadata/de/sbs_esms.htm, (accessed 9. July 2016)

European Commission/Eurostat (2008): NACE Rev. 2 – Statistische Systematik der Wirtschaftszweige in der Europäischen Gemeinschaft. Luxemburg: Amt für amtliche Veröffentlichungen der Europäischen Gemeinschaften, Luxemburg. Available at: https://www.bundesbank.de/Redaktion/DE/Downloads/Service/Meldewesen/Bankenstatistik/Kundensystematik/nace_rev_2.pdf?__blob=publicationFile (German) and http://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF (English) (accessed 8. June 2018)

Fidrmuc, J., Klein, C., Price, R., Wörgötter, A. (2013): Slovakia: A Catching Up Euro Area Member In and Out of the Crisis, p.2, IZA Policy Paper No. 55, Institute for the Study of Labour, Bonn, Germany. Available at: http://ftp.iza.org/pp55.pdf (Accessed 7. May 2018)

Frey, C.B., Osborne, M.A. (2013). The future of employment: How susceptible are jobs to computerisation?, available at http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf, (accessed 7. February 2017).

Granderath, A., Bilski-Neumann, K. (2016). Fmn'16-Interview | ISS nutzt neue Partnerschaft mit IBM, zur Digitalisierung von Facility Services, available at http://www.de.issworld.com/-/media/issworld/de/Files/Presse/Interview%20Dr%20%20Alexander%20Granderath.pdf?la=de-DE, (accessed 7 February 2017).

Jensen, P.A. (2010): The facilities management market in Denmark. In Facilities 28.7/8, S. 383-394

Klein, C., Price, R., Wörgötter, A. (2013): Slovakia: A Catching Up Euro Area Member In and Out of the Crisis, p.2, IZA Policy Paper No. 55, Institute for the Study of Labour, Bonn, Germany. Available at: http://ftp.iza.org/pp55.pdf (Retrieved 7.5.2018)

Nagl, W., Titelbach, G., Valkova, K. (2017), Digitalisierung der Arbeit: Substituierbarkeit von Berufen im Zuge der Automatisierung durch Industrie 4.0., Institut für höhere Studien (IHS) Wien.

Österreichisches Normungsinstitut (2012): ÖNORM EN 15221-4, Facility Management Teil4: Taxonomie, Klassifikation und Strukturen im Facility Management, Ausgabe 2012-03-15. Wien, Österreich.

Redlein, A., Stopajnik, E. (2017): Current Labour Market Situation and Upcoming Trends in the European Facility Service Industry, In World Workplace Europe Conference Proceedings, p. 34 – 42, IFMA Foundation

Statistik Austria (2016): Standard-Dokumentation Metainformation zur Leistungs- und Strukturstatistik, Bearbeitungsstand 01.02.2016, available at: http://www.statistik.gv.at/web_de/statistiken/wirtschaft/produktion_und_bauwesen/leistungs_und_strukturdaten/index.html, (accessed 21. April 2016) S. 4, S. 11

Thomzik, M., Striewe, F., Knickmeier, A. (2010): FM-Branchenreport 2010, Die volkswirtschaftliche Bedeutung der Facility Management-Branche. Bochum, Deutschland: Institut für angewandte Innovationsforschung (IAI) e.V. an der Ruhr-Universität Bochum, Deutscher Verband für Facility Management (GEFMA) e.V., Bonn

World Economic Forum (2016): The Future of Jobs, available at http://www3.weforum.org/docs/WEF_FOJ_Executive_Summary_Jobs.pdf, (accessed 7. February 2017) and The Future of Jobs and Skills, available at http://reports.weforum.org/future-of-jobs-2016/shareable-infographics/, (accessed 7. February 2017).