AUSTRIAN REGIONAL ANALYSIS

BUILDING REGIONAL RESILIENCE TO INDUSTRIAL STRUCTURAL CHANGE

Upper Austria

Upper Austrian Partner

Project Partner: Business Upper Austria – OÖ Wirtschaftsagentur GmbH

Managing Authority

Upper Austrian Provincial Government
Department for Economy – Directorate for Regional Planning, Economic and Rural Development

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INTRODUCTION

FOUNDATION is an Interreg Europe funded SME Competitiveness project that brings together nine partners in a consortium led by Cork Institute of Technology from 1/08/2019 to 31/07/2023. Presently, across Europe, public bodies are pressed by an increasing need to provide preparatory support to the economic ecosystem in advance of the closure of anchor firms in their region which act as significant employers. The impacts of a closure of course go beyond direct employees and ripple, wave like throughout the regional services sector and economy. Management of such anticipated structural change requires proactive renewal of business approaches and policy supports. Regions are encouraged to introduce pilot projects based on their own strengths and to provide appropriate business supports for the re-alignment of the regional industrial base. This proactive approach by regional stakeholders is critical to building the resilience of these regions and enabling them to adapt to change.

The importance of SMEs and start-ups to the regional economy is widely recognised in terms of the provision of employment, contribution to GDP, driving innovation and supporting regional resilience. It is imperative that the relevant regional stakeholders keep informed, inspired and equipped to provide the appropriate SME and start-up supports, particularly in regions anticipating structural change.

FOUNDATION links its project partners to develop Regional Action Plans and an overall Framework and Roadmap for Anticipated Structural Change. It is imperative that industry players, business support organisations and policy makers understand how their ecosystems work and when faced with shocks (firm closures) to collaboratively develop alternative growth and employment through supportive policies and programmes to boost SME competitiveness. Key project activities included the exchange of experience and learning through interregional events (4 workshops, 4 seminars and 9 study visits).

FOUNDATION PROJECT PARTNERS

AUSTRIA – UPPER AUSTRIA

The Business Upper Austria – OÖ Wirtschaftsagentur GmbH is the Austrian partner representing the region of Upper Austria and is project partner number 9 in the FOUNDATION consortium.

Capital: Linz

Size: 11, 980 km^2

Population (2019): 1,482,095

GDP of Upper Austria in 2019: 44,600 per inhabitant

National GERD (%): 3.22 (2019)[1]

% of Unemployment: 4.8 (annual average 2019) – 6.2 (3.2.2020 preliminary figures)

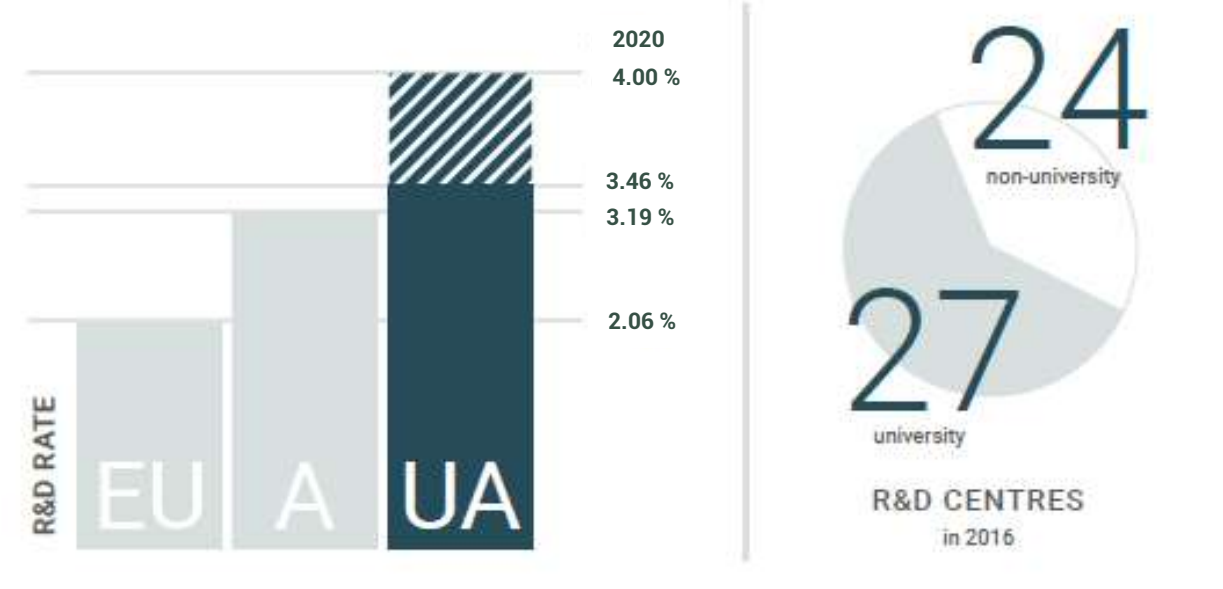
Rearch quota (%): 3.46 (2017; province of Upper Austria; complete survey Statistics Austria)

Upper Austria is located in the heart of Europe in Austria. The region is one of nine federal states in Austria. Itself the region is further divided into four quarters – Mühlviertel, Innviertel, Hausruckviertel and Traunviertel. Compared to the rest of Austria, 16.7% of the whole population of Austria are living in Upper Austria. This means in total numbers 1,482,095 inhabitants in 2019.

Upper Austria offers a number of Universities, universities of applied sciences, schools of live sciences, higher technical colleges and research centres. With an R&D quota of 3.46%, Upper Austria currently exceeds the Austrian average of 3.19% and the 2.06% average within the EU. By 2020, the R&D quota in Upper Austria should reach 4%. Regional government funding has been increased by € 8.5 million and is to be tripled in the period up to 2020.[2]

The landscapes of Upper Austria are just as varied as the array of tourism options they provide. From the undulating hills of the Granitland in the north, the Mühlviertel region, the Danube region with its picturesque spots, to the sophisticated regional capital of Linz; through to the Salzkammergut region in the south, which brims with mountains and lakes, and on to the alpine Pyhrn-Priel region and the densely forested Kalkalpen National Park.[3]

[1] *OECD, 2020, Gross domestic spending on R&D (indicator). doi: 10.1787/d8b068b4-en.*
[2] *https://steiermark.orf.at/v2/news/stories/2859969/*
https://www.derstandard.at/story/2000095872696/oesterreich-mit-zweithoechsten-forschungsausgaben-in-eu-2017
(https://www.land-oberoesterreich.gv.at/Mediendateien/LK/PKStelzer310302016Internet.pdf)
http://wko.at/statistik/eu/europa-forschungsausgaben.pdf
[3] *https://www.roadmap2upperaustria.at/old/your-partners/business-upper-austria/upper-austrian-tourism-board/*



Source: *Investors Guide Business Upper Austria – OÖ Wirtschaftsagentur GmbH (2016, adapted in 2020)*

REGIONAL POPULATION AND INDUSTRIAL STATISTICS

Upper Austria is behind Vienna and Lower Austria the third largest federal state in terms of population. One-six of Austria's population (about 1.5 mil.) are living in Upper Austria. The population density for the whole federal state is 122 inhabitants/km^2, in the urban centres significantly higher. The provincial capital has got 205,000 inhabitants.[4]

Estimates show that the population of Upper Austria is going to grow further until 2037 and will get a little elder and diverse. At present 1.456 mil. people are living in Upper Austria. Until 2037 the number will increase up to 1.529 mil. inhabitants. The average number of children per woman will edge up to 1.69 children. The average life expectancy will rise by 3.6 years for women (87.4 years) and for men by 4.3 years (83.2 years). An international migration surplus will continue, although a decline of 3.9 people per 1,000 inhabitants will be predicted. The population pyramid demonstrates clearly how the composition of the age-structure will change until 2037. Whereas the proportion of children will stay relatively stable the share of the working population will decrease and the amount of "young elderly people and the share of the very old people will significantly increase. [5]

In July 2020 the unemployment rate in Upper Austria was 6.2% (Austrian average: 9.2%), which amounts to an increase by 1.8 percentage points. The number of persons employed amounted to 679,000 (-10,000 or rather -1.5% fewer than in the previous year). At the same time the number of unemployed increased, compared with last year by 40.9% up to 44,499 people. [6] In 2017 the average disposable income per capita for private households in Upper Austria was € 23,500 (Austria: € 23,300), which is located in the mid-range. [7]

Upper Austria can be characterized in a nutshell as a strong technology location with major industrial companies and innovative SMEs. As the nation's leading export, technology and industrial region, Upper Austria offers everything that companies in international competition need in the shape of first-class infrastructure, qualified specialists, a creative environment and the highest living standards. Upper Austria contributes 24.4% of Austria's total production value, which represents the top national figure. Furthermore, Upper Austria is the country's leading export region with a share of 25.4% (2018). In 2019, 17.1% of the total gross value added provided by business and industry came from Upper Austria, which meant that in a national regional comparison, Upper Austria was second behind Vienna. Nearly 60 % of Upper Austria's economic performance relates to export markets, mainly Germany, USA, Italy, France and Czech Republic. [8]

[4] *https://www.land-oberoesterreich.gv.at/18570.htm*
[5] *https://www.land-oberoesterreich.gv.at/files/publikationen/praes_zak_demografische_zeitreise_ooe_2037.pdf*
[6] *https://www.wko.at/service/ooe/zahlen-daten-fakten/Medieninfo_2020-07.pdf*
[7] *https://www.land-oberoesterreich.gv.at/Mediendateien/Formulare/DokumenteAbt_Stat/Einkommen_2017_Pro_Kopf.pdf*
[8] *https://www.biz-up.at/standort-oberoesterreich/standort-oberoesterreich/*
https://www.iv-oberoesterreich.at/de/industrieland-oo/industrie-und-was-dazu-gehört
http://wko.at/statistik/bundesland/BWS_%C3%96.pdf

In 2017, Upper Austria had economic growth of € 63,395 million, which gives a per capita figure of € 43,100. In relative terms, this means that Austria had economic growth of 2.6% and Upper Austria 3.3%. This was above the national average.[9] In 2019 there were 5,422 new companies in Upper Austria.[10]

Upper Austria has locational advantages in the following areas in both a corporate and research regard: mechanical engineering and mechatronics, mobility, plastics, ICT & digitization, lightweight technology and logistics.[11] In the chapter of strategic programs the latest strategic program #upperVISION2030 and fields of strengths is described.

For further information please follow the link: https://www.upperaustria.at/

[9] *http://wko.at/statistik/prognose/prognose.pdf http://wko.at/statistik/bundesland/basisdaten.pdf*
[10] *http://wko.at/statistik/bezirksdaten/neugruendungen2019.pdf?_ga=2.146896052.2077523583.1598251226-1807543100.1586876587*
[11] *Business Upper Austria – OÖ Wirtschaftsagentur GmbH, 2020, Location Presentation of Upper Austria.*

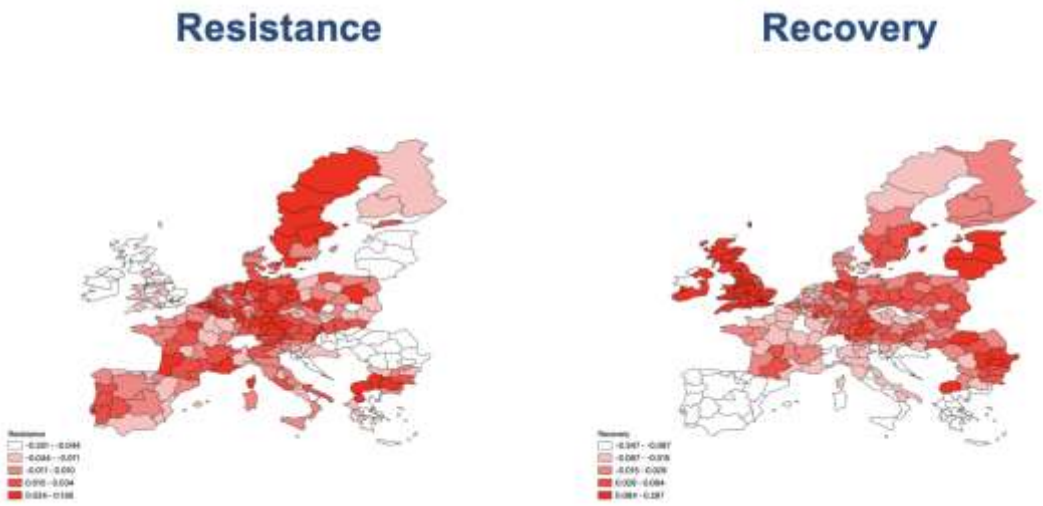
ECONOMIC RESILIENCE ACROSS EUROPE

The 2007/8 economic crisis was the most severe shock to global financial markets since the great depression in the 1930s (Bordo and Landon-Lane, 2010; Barranco and Sudrià, 2012). Following the crisis there was a re-emergence of interest in how regional economies respond to and recover from economic shocks (Martin, 2012; Fingleton, Garretsen and Martin, 2012; Martin and Sunley, 2015; Doran and Fingleton, 2016). The term resilience in economic geography refers to the ability of a region 'to anticipate, prepare for, respond to and recover from a disturbance' (Foster, 2007; 14). There are three main conceptualisations of resilience; engineering, ecological, and evolutionary. Engineering resilience is an equilibrium based notion of how an entity or system is plunged into disequilibrium, and off its steady state, following a shock and can defined 'how fast the variables return towards their equilibrium following a perturbation' (Pimm 1984: 322). The concept of ecological resilience can be defined as the 'the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state variables, driving variables, and parameters, and still persist' (Holing 1973: 41). The region may settle on an inferior path post-shock or recover and assume a superior path post-shock.

However, these two forms of resilience have been criticised as too limiting and evolutionary resilience has gain significant focus in recent years. Martin and Sunley (2015) introduced such a conceptualisation of resilience defining it as a changing process that is adaptive. The adaptive capacities are based on the ability of the region to resist, reorientation, and recover following shocks. Martin and Sunley (2015:13) defined 'adaptive resilience' as 'the capacity of a regional or local economy to withstand or recover from market, competitive and environmental shocks to its developmental growth path, if necessary, by undergoing adaptive changes to its economic structures and its social and institutional arrangements, so as to maintain or restore its previous developmental path, or transit to a new sustainable path characterized by a fuller and more productive use of its physical, human and environmental resources'.

There are four broad ways of measuring resilience; (i) case studies, (ii) indices of particular regions in a descriptive discussion, (iii) Time series analysis focusing on the evolution over time, (iv) causal economic models. In this overview of regional resilience, it is the final approach, causal economic models, which is employed. The conceptualization of Martin and Sunley (2015:13) and Martin et al (2016) is employed to assess the resistance and recovery of regions following the 2007/08 economic crisis.

Figure 1: The resistance and recovery of European Regions to the 2008 economic crisis

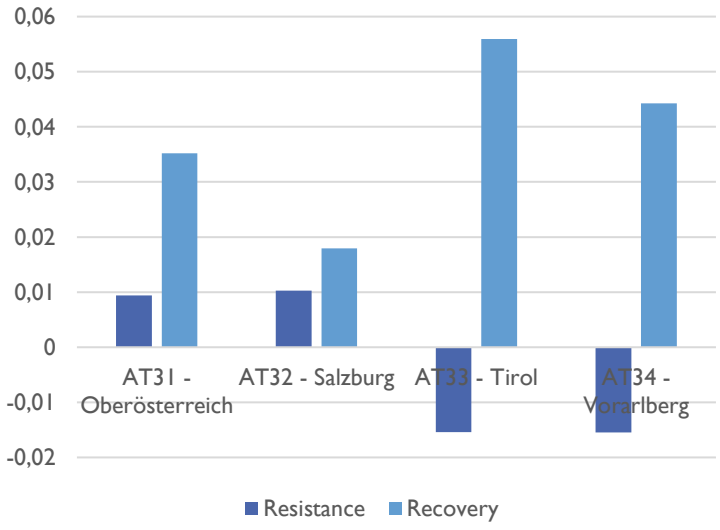


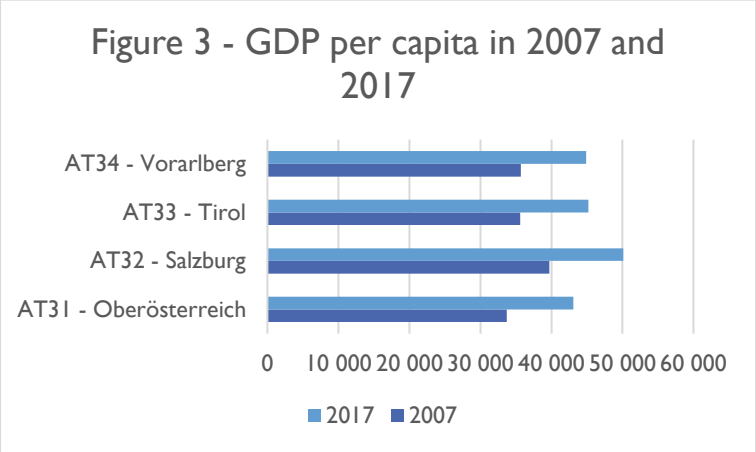
In Figure 1 the left hand side shows the resistance to the 2008 economic crisis while the right hand side shows the recovery following the 2008 economic crisis. In both instances the darker red colour shows that that region performed relatively better than the European average at resisting the shock (in the left figure) or recovering from the impact of the shock (in the right figure).

AUSTRIA (LINZ) – NUTS2 OBERÖSTERREICH

To provide insights into the impact of past shocks on this economy and its relative resistance and recovery following these shocks Figure 2 presents an analysis of the resilience of select Austrian regions. We can observe that Oberösterreich region resisted the impact of the 2008 economic shock relatively strongly compared to the national average (the 0 axis) and that it exhibited a stronger than average recovery post shock.

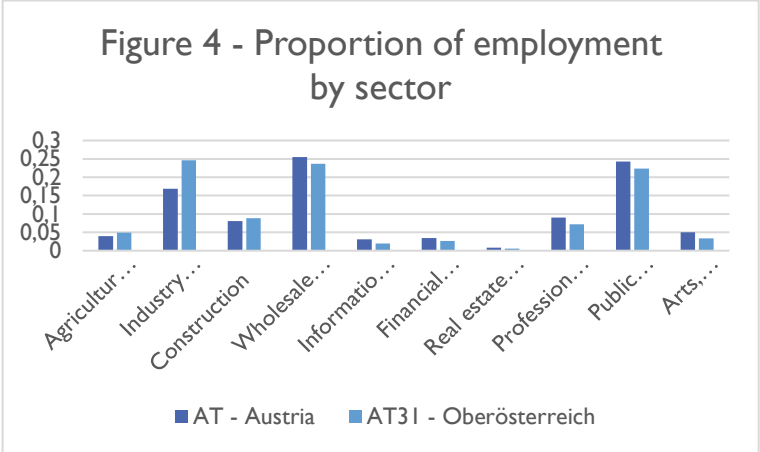
Figure 2 NUTS2 Resistance and Recovery

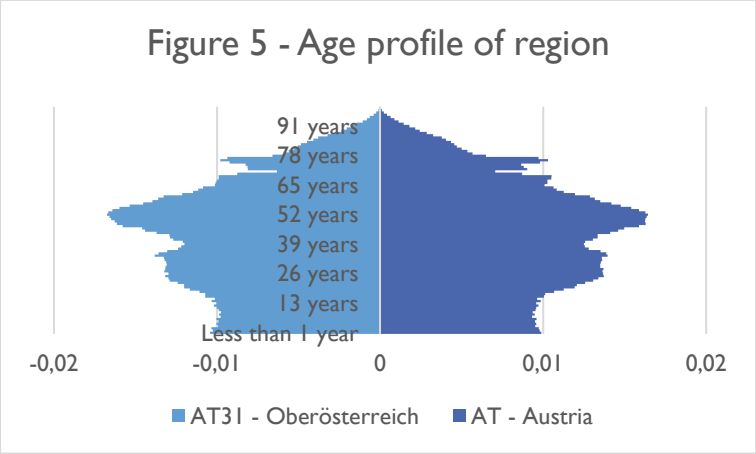




The impact of this pattern of adhearing close to the national average in resistance and recovery has resulted in seeing an increase in the Oberösterreich region GDP per capita in 2017 relative to its 2007 value. GDP per capita in the region is approximately 102% of the national average.

The proportion of the workforce employed across sectors in the Oberösterreich is very similar to that of the overall Austrian economy. However, there are more people employed in the industry sector of the economy with a lower proportion employed in public administration and wholesale sectors.





The age profile of the Oberösterreich region is similar to the national average, with the average age being approximately the same at 42 years. However, the region does display an aging demographic with a spike in the number of individuals aged around 45 to 60.

Regarding the engagement of the region in high-technology employment, Figure 6 compares the Oberösterreich region to the national average over the period 2008 to 2018. It can be noted that the region has followed the national trend relatively closely but has been consistently below the national average.

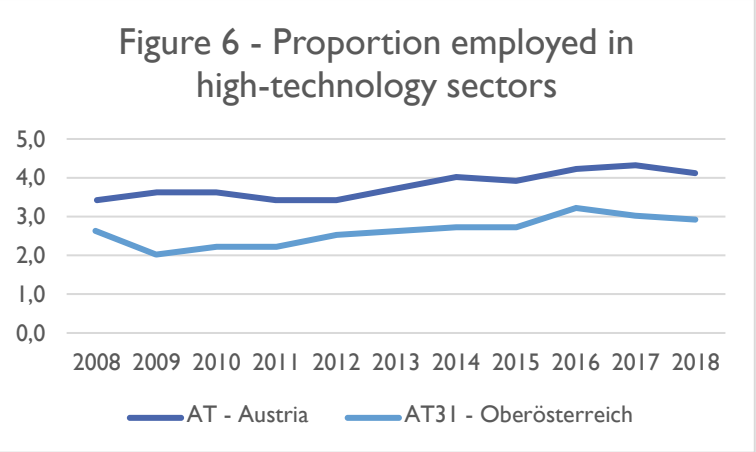


Table 1 below presents a brief comparison of the regions participating in this project. Significant variations can be observed across the regions with the Southern region of Ireland standing out with an exceptionally high level of GDP per capita and high-tech employment. While the Podkarpackie region of Poland has the lowest level of GDP per capita while the Vidurio ir vakaru Lietuvos regionas of Lithuania has the lowest level of high-tech employment as a proportion of employment.

Table 1: Comparison of Study Regions

Region	GDP - 2017	High Tech Emp % - 2018
FI1D - Pohjois- ja Itä-Suomi	33,800	4.10%
UKD3 - Greater Manchester	30,500	5.00%
IE05 – Southern Region	74,700	7.40%
LT02 - Vidurio ir vakaru Lietuvos regionas	12,400	1.50%
PL82 - Podkarpackie	8,500	2.10%
HU22 - Nyugat-Dunántúl	13,400	3.90%
AT31 - Oberösterreich	43,100	3.00%
ITC2 - Valle d'Aosta/Vallée d'Aoste	35,200	3.30%
ES62 - Región de Murcia	20,600	1.60%

INDUSTRIAL RESTRUCTURING IN UPPER AUSTRIA

The following chapter is divided into two main parts: the historical economic background and the history of strategic programs of Upper Austria. First the historical timeline is described and an example of privatisation is elaborated based on the voestalpine AG. This shows a short overview on the restructuring of the industries over the centuries. Furthermore, Upper Austrian strategic programs and the main findings of the latest economic and strategic program #upperVISION2030 is explained. Based on the knowledge and exchange with the Upper Austrian key policy players, the strategic program can be developed to foster the regions' fields of strength. That's why they are listed for a better understanding of the Upper Austrian interconnections and strategic process.

HISTORICAL ECONOMY BACKGROUND OF UPPER AUSTRIA

In order to understand how the region Upper Austria became from an agricultural country to one of the centres of Austrian industries it is important to highlight historical economic milestones. In the following the historical economy background is described beginning with the 19th century and the changes due to industrialization.

INDUSTRIALIZATION (19TH CENTURY)

In the second half of the 19th century, industrialization progressed ever more strongly, gradually changing the essentially agrarian country. But despite the advancing industrialization process, Upper Austria was still predominantly an agricultural country, where more than half of the working population worked in agriculture and forestry before the outbreak of the First World War.[12] The immediate triggers of industrialization were English inventions, especially in textiles, iron and steel production, and the use of steam power.[13]

It was not until shortly before the turn of the century that industry began to take off. In 1884, on the initiative of the industrialist Josef Werndl, various parts of the city of Steyr were illuminated by electricity for the first time. The development of a railroad network played a decisive role. In 1897, the newly founded "Tramway- und Elektrizitätsgesellschaft Linz-Urfahr" converted the horse-drawn tramway, which had been opened in 1880, to electric road operation.[14] The railroad became the symbol of the industrial revolution.[15]

[12] *https://www.land-oberoesterreich.gv.at/24430.htm*
[13] *https://www.nationalgeographic.org/article/industrial-revolution-and-technology/*
[14] *https://www.land-oberoesterreich.gv.at/24430.htm*
[15] *https://www.nationalgeographic.org/article/industrial-revolution-and-technology/*

By far the largest industrial enterprise in the country was the arms factory founded by Josef Werndl in Steyr in 1864.

Figure 7: Industry in Steyr around 1914[16]

In the machinery sector, in addition to the Linz shipyard and the Krauß & Co. locomotive factory built in Linz in 1881, several producers of mainly agricultural machinery and equipment should also be mentioned, such as Pöttinger in Grieskirchen and Epple-Buxbaum in Wels.[17]

Towards the end of the 19th century, the knife-making industry, which was in particular distress because of economic liberalism, needed public support. In the export-dependent scythe and sickle production, a process of concentration on larger companies with factory production began, to which all Mühlviertel scythe factories fell victim. The textile industry increasingly switched to machine processing of cotton. This increased the pressure on the traditional but technically backward Mühlviertel linen weaving industry. It was concentrated in factories in Haslach, Helfenberg and Lichtenau.[18]

Larger and well-known companies in the food and luxury food industry were, for example, the Zipf brewery, the Adolf J. Titze and Heinrich Franck coffee maker factories in Linz, and the Franz Fritsch and C. H. Knorr in Wels. The machine-producing paper industry was booming, with large factories in Nettingsdorf, Steyrermühl, Laakirchen, Obermühl and Lenzing. In the leather industry, the factories in Rohrbach (Josef Pöschl), Mattighofen (Friedrich Vogl), Wels (Gebrüder Adler and A. Ploberger) and Neumarkt am Hausruck (Wurm) were leading. The largest chemical plants were the soda factory in Ebensee (Solvay) and the match factory in Linz (Union and Solo, respectively).[19]

[16] *https://www.steyr.at/Geschichte_der_Stadt_Steyr*
[17] *https://www.land-oberoesterreich.gv.at/24430.htm*
[18] *https://www.land-oberoesterreich.gv.at/24430.htm*
[19] *https://www.land-oberoesterreich.gv.at/24430.htm*

INTERWAR PERIOD

Despite great difficulties, the state politicians tried to develop the economic potential of Upper Austria: Electrification and motorization began to change the lives of the predominantly rural population. The urban population suffered first from hunger and devastating inflation (1918 - 1922), then increasingly from rising unemployment (1932: 35,000 unemployed in Upper Austria).[20]

SECOND WORLD WAR

Following annexation of Austria by the Third Reich in 1938, Austria became part of the German economic area. The National Socialists strove to get unemployment under control. One focus was on investment in the construction of roads, housing and schools. The unemployment rate in Upper Austria fell from 18.2% in December 1937 to 5% at the end of 1938. Full employment was achieved in the spring of 1939, but a short time later there was already a shortage of labor, which was exacerbated by the outbreak of World War II and conscription into the Wehrmacht and was to last until the fall of the Third Reich.[21]

Rearmament in the Third Reich took place on a scale that necessitated large-scale factories with the most modern methods of mass production. The Upper Austrian industrial culture developed towards iron and metal processing. In Oberdonau, the Eisenwerke Oberdonau, a tank factory, was established. The Ranshofen aluminum smelter - Germany's largest aluminum producer in 1944 - supplied basic materials for the aircraft industry and the nitrogen works for munitions production. In Wels, construction of an aircraft repair plant began in 1938.[22]

The construction of the industrial plants of the "Hermann-Göring-Werke" (today voestalpine AG) as well as the "Linzer Stickstoffwerke" and housing estates, mainly for workers of the new large industrial plants, gave Linz the characterization of an industrial city.[23]

[20] *https://www.land-oberoesterreich.gv.at/24579.htm*
[21] *Goldberger. and Sulzbacher, 2008, https://www.ooegeschichte.at/epochen/nationalsozialismus/wirtschaft/einleitung/*
[22] *Goldberger, and Sulzbacher, 2008, https://www.ooegeschichte.at/epochen/nationalsozialismus/wirtschaft/einleitung*
[23] *Goldberger, and Sulzbacher, 2008, https://www.ooegeschichte.at/epochen/nationalsozialismus/wirtschaft/einleitung*

Figure 8: View in the direction of the blast furnace at Hermann-Göring-Werke in 1942[24]

The largest armaments factory in Upper Austria, however, was Steyr-Werke, which produced rifles, pistols, machine guns and tank rifles, among other things. In addition to weapons production, Steyr-Werke was also involved in car production. The Steyr-Werke reached their highest production figures in 1943. In February and March 1944, they were the target of Allied air raids for the first time. This also marked the beginning of the relocation of production. Weapons manufacturing came to Molln, while the production of barrels and MP spare parts was transferred to the underground facilities in Gusen, where prisoners from the Gusen concentration camp were forced to work.[25]

Figure 9: Steyr-Werke in 1942[26]

[24] *Voestalpine, https://www.voestalpine.com/group/de/konzern/ueberblick/historie/*
[25] *Goldberger, and Sulzbacher, 2008, https://www.ooegeschichte.at/epochen/nationalsozialismus/wirtschaft/ruestungsindustrie/*
[26] *Geschichte Club Stahl, https://www.ooegeschichte.at/?type=1234&tx_theme_pi3%5Bfile%5D=%2Fmedia%2Fbilder%2Fallgemein%2Frundgaenge_neu%2Fns-zeit%2F03-wirtschaft%2Fb0223.jpg&cHash=9439d5e2a4d3106eaf7127c48bb41861*

In contrast to large-scale industry, shutdowns occurred in the area of Upper Austrian commercial and trading enterprises. At the beginning of 1945, work had ceased in all breweries and in almost all paper mills. In the textile industry, there was only one new establishment in Schwanenstadt, where mainly special fabrics were produced for the Wehrmacht. On the other hand, the scythe industry experienced an upswing until 1942/43, as did the mining industry.[27]

OCCUPATION AND RECONSTRUCTION PERIOD

While the first years of the post-war period were mainly characterized by hardship, the struggle for survival and clearing-up work, from 1947 onward, it was possible to turn to general reconstruction with tenacious energy. Despite pressing problems with energy and raw materials, production in the various sectors of the economy got underway again surprisingly quickly, with the assistance of the American occupying power playing a key role, e.g., in the form of ERP funds under the Marshall Plan.[28]

FROM THE STATE TREATY TO THE PRESENT

Economically, Upper Austria experienced a tremendous upward development after 1955 during the phases of boom interrupted by some fluctuations. The former agricultural state had become one of Austria's leading industrial states as a result of expansion since 1938. The largest and most important domestic employer is voestalpine in Linz. The Upper Austrian economy was not spared the effects of the worldwide recession in the wake of the so-called oil price shock in 1974. In addition, there were the consequences of the use of new operational high technologies, which also contributed to the increase in the unemployment rate. Many workers also had to be laid off in the large nationalized companies.[29]

During the severe crisis of nationalized large-scale industry in the 1980s, the country's broad-based economic strength proved its worth. Environmental threats were also recognized in good time, and successful countermeasures were taken. Today, Upper Austria secures its place in the European Union as a strong and self-confident region.[30]

The growing prosperity of the Upper Austrian population can be seen not least in the rapid increase in motorization. This wave of motorization was accompanied by a rapid expansion and substantial improvement of Upper Austria's road network. In this context, the extensive electrification of the Upper Austrian railroad network should also be mentioned, as well as the expansion of the Linz Danube port and the Linz-Hörsching international airport.[31]

[27] *Goldberger, and Sulzbacher, 2008, https://www.ooegeschichte.at/epochen/nationalsozialismus/wirtschaft/einleitung*
[28] *https://www.land-oberoesterreich.gv.at/24588.htm*
[29] *https://www.land-oberoesterreich.gv.at/24713.htm*
[30] *https://www.land-oberoesterreich.gv.at/24713.htm*
[31] *https://www.land-oberoesterreich.gv.at/24713.htm*

OVERVIEW

As described the industrialisation and as well the investment of the second world war had a strong impact on Upper Austria industry. Today Upper Austria is the number one industrial state and exporter of Austria. Overall the Upper Austrian economical history shows, for resilience an important factor is to build on and develop the regions' competence fields. Based on various economic and politic actions Upper Austria has handled different crisis, restructuring and changes in history. One of the mentioned political actions to restructure the industry of Upper Austria is the example of voestalpine AG, as mentioned the largest and most important domestic employer, which is further elaborated in the next sub-chapter.

ECONOMIC RESTRUCTURING IN THE REGION - EXAMPLE VOESTALPINE PRIVATISATION

The example of the privatisation of voestalpine is a good practice on how privatisation has worked successfully. Today, voestalpine (headquartered in Linz, Upper Austria) is in its business segments a globally leading steel and technology Group with a unique combination of materials and processing expertise. The Group is a leading partner, thanks to its top-quality products and system solutions using steel and other metals, to the automotive and consumer goods industries as well as to the aerospace and oil & natural gas industries. voestalpine is also the world market leader in railway infrastructure systems, tool steel, and special sections.[32] It has around 500 Group companies and locations in more than 50 countries on all five continents and has been listed on the Vienna Stock Exchange since 1995. voestalpine has four divisions: the steel division, the high performance metals division, the metal engineering division and the metal forming division. The Group is fully committed to the global climate goals and is working intensively to develop technologies which will allow it to decarbonize and reduce its CO2 emissions over the long term. In the business year 2019/20, voestalpine generated a revenue of EUR 12.7 billion, with an operating result (EBITDA) of EUR 1.2 billion and it employs about 49,000 people worldwide.[33]

[32] *https://reports.voestalpine.com/2020/cr-report/servicepages/downloads/files/zahlen-daten-fakten-va-crr20.pdf*
[33] *https://www.voestalpine.com/group/en/*

Figure 10: Voestalpine Linz today[34]

"Privatization occurs when a government-owned business, operation, or property becomes owned by a private, non-government party. Note that privatization also describes the transition of a company from being publicly traded to becoming privately held. This is referred to as corporate privatization."[35]

Years before the company voestalpine AG was privatised there were several economic and public discussions concerning the subject of privatisation.[36] voestalpine AG's step towards becoming a fully private company was intended to secure its independence in the long term. Detachment from the influence of the state was seen as an important condition for further successful positioning in the market. Employees of the company, on the other hand, feared a weakening of the group up to its filleting or relocation. Both workers' representatives and politicians described the uncontrollable processes on the capital markets as the reason for this. The dispute escalated due to the simultaneous election campaign in Upper Austria. Of the extensive, often highly emotional actions against privatisation, the 7 km long human chain between voestalpine in Linz and the seat of the Upper Austrian provincial government was the most memorable.[37]

[34] *https://www.voestalpine.com/group/de/media/fotos/*
[35] *https://www.investopedia.com/terms/p/privatization.asp*
[36] *Stadelmann M., 1996, Die Reprivatisierung der verstaatlichten Industrie, Diplomarbeit, JKU Linz*
[37] *https://www.voestalpine.com/blog/de/verantwortung/2003-finale-privatisierungsentscheidung/*

Figure 11: Human chain between voestalpine in Linz and the seat of the Upper Austrian provincial government[38]

The company's management and level-headed politicians tried to objectify the dispute and came up with the finally realised scenario of a broad free float with an Austrian core shareholder structure.[39] The supervisory board of ÖIAG (Österreichische Industrieholding AG) made the decision on 5th September 2003 to fully privatize the voestalpine Group. On behalf of the state of Austria it still held 34.7% of the shares of the company. The whole workforce was in fear for their jobs and widespread political controversy. The complete privatization of the voestalpine AG was carried out to ensure long-term independence.[40]

It was seen an important step for the success of voestalpine AG in the market to remove the company from political influence. Though, employees were afraid that with this step the group would be weakened, if not broken up or relocated. Politicians and the workers' representatives referred to the uncontrollable nature of the capital markets.[41]

The discussion was heated up by the election campaign simultaneously being fought in Upper Austria. The most memorable thing was the 7 km human chain, between voestalpine in Linz and the seat of Upper Austria's provincial government, of the often highly emotional and numerous anti-privatization protests. The management of the Group and reasonable politicians made every effort to return the dispute to an objective level and drafted the scenario of widespread shareholdings and a core of Austrian shareholders which was finally realized.[42]

19.7% of the Group's shares were offered by the ÖIAG on the stock exchange at € 32.50 per share. The decision about the final withdrawal of the government from the firm was preceded by heated political discussions. At the end of the business year in March 2004, the share price

[38] *https://www.voestalpine.com/blog/de/verantwortung/2003-finale-privatisierungsentscheidung/*
[39] *https://www.voestalpine.com/blog/de/verantwortung/2003-finale-privatisierungsentscheidung/*
[40] *https://www.voestalpine.com/blog/en/commitment/2003-final-privatization-decision/*
[41] *https://www.voestalpine.com/blog/en/commitment/2003-final-privatization-decision/*
[42] *https://www.voestalpine.com/blog/en/commitment/2003-final-privatization-decision/*

increased to € 36.80 on basis of the decision to implement complete privatization. ÖIAG subsequently continued to hold 15% of the voestalpine shares by way of a convertible bond, for a period that was limited from the outset.[43]

VOEST-ALPINE STAHL AG up to the Onset of Privatization (1993-1995): In late 1993 VOEST ALPINE STAHL AG, as the managing holding company, was divided into three divisions (flat products, long products and with main divisional companies and subsidiaries as well as acquisitions) against the backdrop of the ongoing steel market crisis. In France, Germany, Italy and Belgium processing and service sites were located. In 1994, to optimize its portfolio, the company divests itself of activities that either offer to little in the way of synergies of the group (e.g. VOEST-ALPINE Stahl Judenburg GmbH) or are unrelated to its core segments. [44]

The next step comprises the specialization and concentration on high-quality niche products. A balanced client portfolio became the firm's distinguishing characteristics – key customers include leading European automobile and white goods manufacturers, the construction industry as well as the international railway authorities.[45]

As part of a two-year research project the VOEST-ALPINE Industrieanlagenbau GmbH in cooperation with the VOEST-ALPINE Stahl Linz GmbH developed the start-up at the Linz site of a new, globally unique dedusting system for Sinter Belt 5.[46]

A mechatronics laboratory was opened at the Linz training centre and the expansion of electrolytic strip galvanizing were completed. An apprenticeship training program was developed at Linz-based VOEST-ALPINE Stahl in cooperation with the University of Linz that leads to qualification as a "mechatronics technician."[47]

Moreover, in 1994, major investments were approved for the years to come e.g. the installation of a continuous annealing line and the construction of a new continuous caster. 1995 is dominated by the transition of VOEST-ALPINE STAHL AG from a nationalized to a public company. In October 1995 the privatization of VOEST-ALPINE STAHL AG started with the sale of 31.7 percent of the Republic of Austria's shares on the stock exchange. In this period a number of acquisitions were made. For instance, in 1998, the VOEST-ALPINE KREMS Group acquires METSEC plc, a British company, to buttress its already leading position in the European steel sections and precision tubes segment. In 2001, voestalpine motion GmbH purchases the Dutch automotive supplier Polynorm N.V. – it is the largest acquisition to date in the history of the voestalpine Group. Up until 1998, the voestalpine Group continues to enhance its product mix and expand the share of processing operations.[48]

[43] *https://www.voestalpine.com/blog/en/commitment/2003-final-privatization-decision/*
[44] *https://www.voestalpine.com/group/en/group/overview/history/*
[45] *https://www.voestalpine.com/group/en/group/overview/history/*
[46] *https://www.voestalpine.com/group/en/group/overview/history/*
[47] *https://www.voestalpine.com/group/en/group/overview/history/*
[48] *https://www.voestalpine.com/group/en/group/overview/history/*

From November 2001 the employee shareholding scheme was implemented at the Group level. About four percent of the Group's sites in Austria were held by its employees. In 2001 the corporate structure of the company was changed – the Group was divided into four divisions – Steel, Motion (renamed Automotive later on), Railway Systems and Profilform. This results not just in processing and finishing steel, but also extending the value chain in crucial ways to high-tech companies and niche providers. The group's strategy focuses on quality instead of volume increases, as before. It was finally renamed voestalpine AG: from this point forward, it pursues an umbrella brand strategy under the voestalpine brand.[49]

The first listing of the voestalpine share on the Vienna Stock Exchange in autumn 1995 marked the beginning of privatisation and the economic rise from a "classic" nationalised steel producer to an internationally successful technology and industrial goods group with its own steel base. Today, the group employs almost 50,000 people worldwide - more than three times as many as in 1995.[50] This successful privatisation was also a great success for the Upper Austrian location.

STRATEGIC PROGRAMS UPPER AUSTRIA

The establishment of Upper Austrian strategic programs was a response to the mentioned economic crisis in the 1980s as highlighted in the chapter of industrial history. The basis of the first strategic program was the foundation of a central economic agency and the focus on technology, professional qualification and location marketing. Since then Upper Austria has a long tradition of creating innovative strategic programmes ("Upper Austria 2000+", "Innovative Upper Austria 2010", "Innovative Upper Austria 2010plus" and "Innovative Upper Austria 2020"). The characteristics and peculiarities of the regional economy always build the foundations for the development of the region's economic and research programmes. Strategic goals must begin from this point and identify viable paths for further development.[51]

In order to stand out in the face of global competition and make Upper Austria future-proof over the long term, it is necessary to project a uniform image of the future that can be flexibly adapted to new trends and developments. Our business and research strategy #upperVISION2030 opens a new chapter for Upper Austria as we veer away from a rigid programme towards a strategy that develops year on year. The new strategy process allows us to act more flexibly. The framework it defines also offers the long-term orientation necessary.[52]

[49] *https://www.voestalpine.com/group/en/group/overview/history/*
[50] *https://www.voestalpine.com/group/de/media/presseaussendungen/2015-10-07-voestalpine-feiert-20-jahre-an-der-boerse/*
[51] *https://www.ooe2020.at/fileadmin/user_upload/Projektwebsites/ooe2020/Downloads/Programmbuch_englisch.pdf*
[52] *https://www.uppervision.at/en/*

"How do you manage to not jump on every trend and still keep ahead?" A location, a region, needs a shared strategy. #upperVISION2030 is far from being the first strategy for business and research policy in Upper Austria - on the contrary: we launched our first strategic programme more than 20 years ago. The pace of development has increased dramatically over the past two decades. When the term "evolution" is no longer sufficient to describe the force of change, then it is referred to as disruption. How can an entire region with its innumerable protagonists equip itself for an era in which today's boom sectors have already evaporated by tomorrow? How do you manage to not jump on every bandwagon and still keep ahead?" #upperVISION2030 is the well thought out, shared response. On the one hand it is a stringent process to ensure both long-term orientation and sufficient flexibility. And it is also a clear concept in terms of content designed to meet the great challenges of our time so that the existing strengths of Upper Austria as a location are used in the best possible way. The central focus is on people and their skills with a view to social and technological developments.[53]

FIT FOR DIGITAL AGE The economic and social benefits of the digital transformation have been successfully implemented in business and industry - our main focus is on people. By 2030 Upper Austria will be a dynamic and cosmopolitan model region for digital humanism - an era that is now emerging as a result of the cooperation between all political, economic and scientific forces.[54]

FIT FOR SUSTAINABLE SOLUTIONS In 2030 Upper Austria will be perceived as an industrial region that acts sustainably and that people want to live in. The responsible use and reuse of resources is an essential element here. Upper Austrian businesses and industries are an essential part of the solution to future challenges and can therefore continue to maintain their position among the top players on a global playing field.[55]

FIT FOR HUMAN-CENTERED TECHNOLOGY Artificial intelligence and robotics will be implemented in all areas of life in 2030 wherever they are needed. The underlying technologies have been made comprehensible to the general public leading to a high level of acceptance in daily use.[56]

FIT FOR NEW MOBILITY Upper Austria has successfully mastered the structural change in the mobility sector in 2030. Thanks to their expertise, Upper Austrian companies continue to be sought-after partners internationally and successful providers of mobility solutions and components.[57]

[53] *https://www.uppervision.at/en/*
[54] *https://www.uppervision.at/en/*
[55] *https://www.uppervision.at/en/*
[56] *https://www.uppervision.at/en/*
[57] *https://www.uppervision.at/en/*

LOCATION PARTNERS - WORKING TOGETHER TO BE A LEADING INNOVATIVE REGION[58]

Taking steps and developing measures that benefit the region as a whole, the Upper Austrian location partners are now involved even more than before in the processes for implementing business and research strategy. #upperVISION2030 is a strategic framework designed to support location partners in their year on year planning of business action measures. Annual dialogue rooms guarantee coordinated action without restricting each organisation's freedom to act on their own.

BUILDING THE PROCESS[59]

Developing new methods and future-proofing the existing ones - these are the guiding principles behind the process for the new #upperVISION2030 strategy. Coupled with a new approach focussing on key topics that are important for the future, the Upper Austrian business and research strategy #upperVISION2030 was developed by building on the experience gained from the strategic business and research programme Innovative Upper Austria 2020. The integration of external experts enriched the internal view of the location partners on Upper Austria during the strategy development process. That is how Fraunhofer ISI was able to integrate international expertise into the process, as well as national expertise through the Industry 4.0 platform and regional expertise through the Upper Austrian Future Academy. Based on their expert knowledge, current trends and drivers were able to be identified and integrated into the process. The corresponding strategies "Upper Austrian Jobs 2030", "Energy Leading Region Upper Austria 2050" and "Tourism Strategy 2022" were also taken into account.

KEY POLICY PLAYERS IN UPPER AUSTRIA

As explained in the previous sub-chapter, the key policy players are crucial for the political and economic cooperation. The combination of an external, expert-driven strategy development integrated into the Upper Austrian business and research landscape represented by location partners, made it possible to look beyond the borders of Upper Austria. In the following the key policy players of Upper Austria are shortly described.

[58] *https://www.uppervision.at/en/*
[59] *https://www.uppervision.at/en/*

	Short descriptions
Government of Upper Austria	The government of Upper Austria is the gateway to all those companies in the fields of health, tourism, culture, education, housing, public transport, nature and infrastructure.
Upper Austrian Chamber of Commerce	With its expertise and lobbying power, the Upper Austrian Chamber of Commerce ensures optimal framework conditions for entrepreneurship and actively creates partnership-based solutions for location development. The WKO currently represents around 100,000 member companies. Furthermore, the Upper Austrian Chamber of Commerce offers professional information and consulting services to support the growth and security of businesses. With educational institutions such as the WIFI and universities of applied sciences, the WKO contributes to strengthening the competitiveness of the domestic economy.
Upper Austrian Chamber of Labour	In concrete terms, the Chamber of Labour advises its members (employees) on many issues, such as labour and social law in particular. We also represent employees vis-à-vis politicians and business, have a say in legislation and conduct basic research. Furthermore, the Chamber of Labour offers services such as continuing education and training. Officially, the Chamber also represents international interests, e.g. in Brussels.
Federation of Upper Austrian Industries	The Federation of Austrian Industries (IV) is the voluntary and independent lobby group for Austrian industry and its related sectors. As a recognized partner of politics, it works on the positive further development of Austria. The IV represents the concerns of its currently more than 4,500 members from the manufacturing sector, the banking industry, infrastructure and industry-related services in the provinces, at the federal level and in Europe. Efficient and lean, the IV is a platform for its members to help shape industrial, economic and social policy issues.

Upper Austrian Research	Upper Austrian Research GmbH (UAR) is the leading organization for non-university research of the federal province of Upper Austria and a key player in the research, technology and innovation policy. With its associated companies UAR promotes innovative solutions at the crossroads where fundamental research meets applied research and provides access to top-quality R&D capacities.
Council of research and technology Upper Austria (RFT OÖ)	The Council for Research and Technology for Upper Austria (RFT OÖ) advises the Upper Austrian government on an honorary basis in the subject areas of research, innovation and technology. These agendas are the responsibility of the member of the Upper Austrian government responsible for research matters - Regional Councillor for Economics and Research Markus Achleitner.
Johannes Kepler University	JKU is the largest university in Upper Austria with a broad variety of practice-oriented degree programs and research activities. International teaching and research exchanges play an important role, thus from the third semester on, students can spend one or two semesters abroad at partner universities. Moreover, in cooperation with numerous higher education institutions in Europe and overseas, JKU offers a large number of double-degree and joint degree programs for those who aspire to pursue their studies at various universities.
University of Applied Sciences Upper Austria	FH OÖ is an important player in the higher education of Upper Austria. Cooperation with 250 partner universities worldwide and more than 1,000 industry partners provide a vast amount of opportunities in international education and research. The latest findings from research and development are directly integrated into teaching and project activities, which are utilized by over 600 institutions. Six centers of excellence serve as the basis for cutting-edge and industry-relevant research.
Upper Austrian Future Academy	The Upper Austrian Future Academy contributes to future competence and responsibility in the province of Upper Austria. It provides impulses for making better use of future opportunities, reducing risks and ensuring social and economic stability as well as a high quality of life. Basic preparation and trend observation are the cornerstones of this future work. The Upper Austrian Future Academy is assigned to the Office of the Upper Austrian Provincial Government and to the Governor of the Province, Thomas Stelzer.

INDUSTRIE 4.0 AUSTRIA Platform Industrie 4.0	The association "Industry 4.0 Austria - the platform for intelligent production" was founded in 2015. In a broad alliance, important social, political, economic and scientific players are actively involved in shaping the future world of production and work. The aim is to contribute to increasing future prosperity for all people in Austria. The goal is to make the best possible use of the new technological developments and innovations of digitization (Industry 4.0) for companies and employees and to shape the change in a socially acceptable way for society.

Table 2: Key policy players of Upper Austria

THE STRATEGIC FRAMEWORK AT A GLANCE[60]

In order for Upper Austria to remain a location for business, industry and research and to maintain its international competitiveness, our objective must be to promote the development of products, services and technologies and to generate more founding, researching, technology-oriented and exporting companies in Upper Austria. We focus on smart specialisation and the rapid transfer of research results into business applications in order to place Upper Austria at the forefront of technological developments. In doing so, we build on the existing strengths of our economy and support Upper Austria's leading companies in expanding their technological lead. Through early recognition of disruptive technologies and the rapid identification of areas of application, we can accelerate development of new business models to create future-proof jobs.

Positioning Upper Austria as a modern technology location increases its attractiveness and visibility for skilled and talented employees in the face of international competition. We build on our existing regional and national networks and continue to drive internationalisation forward. In order to overcome system and sector boundaries, we need to build bridges between disciplines that have so far been separate. Our objective is to think more in interdisciplinary approaches in order to make maximum use of the competences and expertise available in Upper Austria. Using the latest digital technologies, we redesign value chains and ensure regional value chains by encouraging cross-sector cooperation.

We set development priorities in areas where we can make promising use of our strengths. At the centre of #upperVISION2030 are people who are skilled and educated and represent a key location factor for Upper Austria. They form the basis for stable growth. For this reason, we must ensure the availability of suitably qualified employees for business, industry and research in Upper Austria over the long term. In addition, there are key technologies and core competences that make Upper Austria independent of a particular industry or subject area.

[60] *https://www.uppervision.at/en/*

In order to meet future challenges, the existing core competencies and key technologies - especially in the fields of mechatronics, materials, and information and communication technology - are being continuously developed and expanded. In the third circle, the digital transformation stands as an enabler for all business sectors. Finally, the three content-related fields of "Systems & technologies for people", "Efficient and sustainable industry & production" and "Connected and efficient mobility" follow with their respective thematic focuses.

The following figure 12 shows the fields of action of #upperVISION2030 as an overview

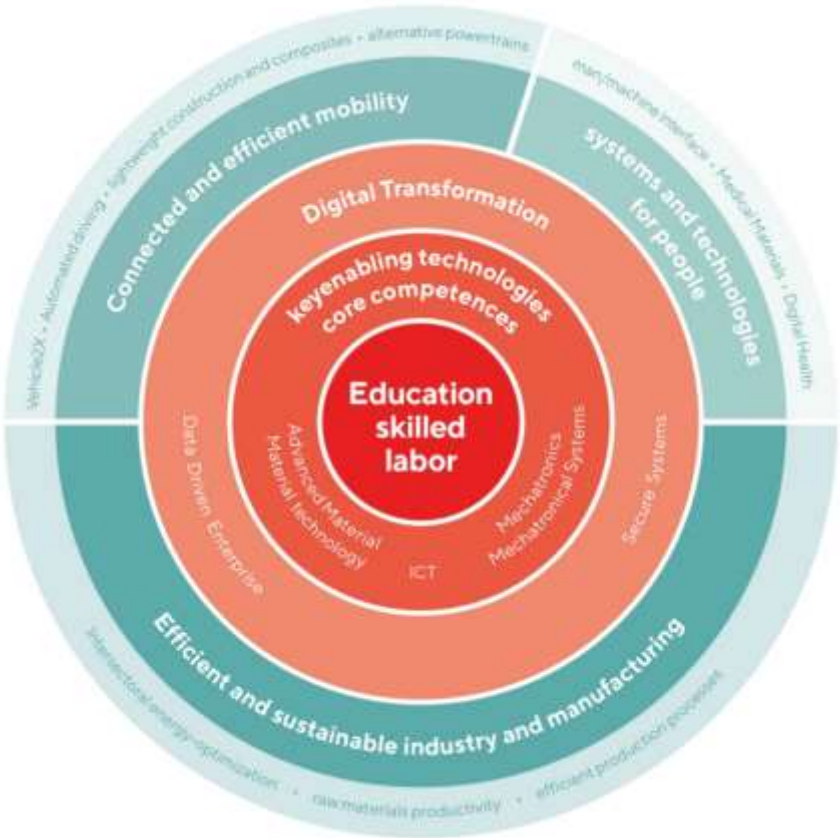


Figure 12: The fields of action of #upperVISION2030[61]

[61] *https://www.uppervision.at/en/*

INDUSTRY IN TRANSITION

Due to covid-19, the process of #upperVISION2030 was adapted and a survey for the entire industry was conducted to specify the process. The following chapter explains the results of the survey and the industry in transition case – automotive industry. The status quo of the automotive industry and the future transition are described as well as the scenarios of possible framework conditions for the mobility industry in Upper Austria and the results of the study.

EFFECTS OF THE CORONA CRISIS ON THE INDUSTRY

The Corona crisis acted less as a trigger than as a catalyst to the industry's structural weaknesses and negative performance, mainly on the automotive industry as described in the last chapter, but honestly all industrial sectors were influenced.

An online survey was carried out to provide valuable insights on the assessable impacts of the COVID-19 pandemic on economy and innovation in Upper Austria. Austria and Upper Austria are affected by a negative development of the occurrence of infection. It is to be expected simultaneously, that the Upper Austrian economy will further show resilience in relative comparison to the other federal provinces of Austria.[62]

EXPECTED ECONOMIC DEVELOPMENT[63]

In this part of the regional analysis the results of the online survey were used to estimate the impacts of the COVID-19 pandemic for the research and business location of Upper Austria. Both the participation and the feedback from the survey show, that the economy as well as the innovation landscape of Upper Austria are heavily impacted by the crisis.

Participating companies consider that the revenues, in comparison to the prior year, will lightly increase in 2020 and 2021 and in 2022 a significant rise will be expected. With regard to export sales a decline will be considered in 2020 in comparison to 2019. Entrepreneurs are cautiously optimistic for 2021, a light increase is predicted in 2021 and a significant increase in 2022. The development of employees is estimated similarly carefully, a slight decline for 2020 and modest rises in 2021 and 2022 can be forecasted.

The assessment of developments of the R&D employees is more optimistic/confident. The answering R&D institutions have a more optimistic expectation regarding the number of employees than the entrepreneurs.

[62] *Joanneum Research, and Business Upper Austria – OÖ Wirtschaftsagentur GmbH, 2020, Standortbericht Oberösterreich 2020.*
[63] *Joanneum Research, and Business Upper Austria – OÖ Wirtschaftsagentur GmbH, 2020, Standortbericht Oberösterreich 2020.*

Within the scope of the online survey the medium to long-term expectations of innovative Upper Austrian companies were requested. Only 31.1 % of the companies are at least cautiously optimistic that national and international markets are going to recover within a year.

Companies in the fields of action "Digital Transformation" and "Connected & efficient Mobility" and ICT companies are most confident. 40 % of the respondents from "Digital Transformation", "Connected & efficient Mobility" and ICT companies and 21 % respondents of other companies from a different sector suspect a recovery of markets within a year. 31.9 % of companies from another sector are of the opinion that postponed projects wouldn't rather be caught up or rather processed. R&D institutions are more optimistic concerning this topic, around 74% agreed or rather agreed that deferred projects will be refurbished.

CHALLENGES AND CHANCES DUE TO THE CRISIS[64]

The majority of participants of the survey agreed that COVID-19 and the resulting economic crisis create enormous challenges. Nevertheless, some respondents see an opportunity in the current situation to set significant steps with regard to sustainability, regionality and new business models.

42.1 % of the responding innovative companies in Upper Austria stated that they have to face liquidity bottlenecks due to missing payments and simultaneously outstanding fixed costs. Especially manufacturing companies are affected (52.3% of this companies have experienced liquidity bottlenecks), as well as companies in the automobile industry, the electrical and electronic industry and the mechanical engineering and metal products industry.

Beside a lack of financial resources, the limited usability e.g. of production facilities is a huge problem too in connection with the COVID-19 protective measures or supply shortfalls from preliminary work, raw materials or service. 21.5 % of the manufacturing companies are facing those limitations. Companies in the sectors "chemicals and plastics" are also severely affected. 42.9 % of the respondents stated that they faced limited usability or rather limited access to production.

More than half of the responding companies was directly affected by restrictions or interruptions in the procurement area. Firms in the research field have been less affected (55 %), while production (60 %) or service companies (58.8 %) have been severely affected. All responding companies within the automobile industry as well as 81.3 % of the firms in the electrical and electronic industry and 76.5 % of the companies in the mechanical engineering and metal products industry faced problems in the procurement area due to COVID-19.

[64] *Joanneum Research, and Business Upper Austria – OÖ Wirtschaftsagentur GmbH, 2020, Standortbericht Oberösterreich 2020.*

About half of the respondents had to accept restrictions or interruptions in the production or performance. In particular companies in the fields of action “Connected & efficient Mobility” (53.1 %) and manufacturing companies (60 %) were affected the most. Even if some firms within the field of action “Systems and technologies for people” could respond to the changing needs and situations, 40% of the companies in this field were facing production restrictions caused by a slump in demand. Firms within the field of “electrical and electronic industry” and “chemicals and plastics” were particularly affected by cuts in demand.

About 16% of all companies could register an increase in production or performance due to the crisis. Within the action fields of “Efficient & sustainable production” as well as manufacturing companies this applies to 20% of respondents in the sector “chemistry and plastics” and 28.6% of the industry “furniture and wooden products”.

According to one fifth of the respondents, the increased use of telework reduces the productivity within the company. This is particularly the case where the provision of services requires access to specific infrastructure on site. 11% of all responding companies and 20.7% of knowledge-intensive service providers perceived an increase in productivity through telework. In the field of action "Connected and efficient mobility", 28.1% of the respondents stated that productivity had decreased due to telework. Research-based companies were most likely to be able to implement telework without too much friction. Although 22.4% of the respondents stated that they had observed a decline in productivity, around 14.3% of the companies also saw an increase in productivity as a result of telework. Telework is most difficult to implement in production companies.

THE MEANING OF THE PANDEMIC FOR THE EMPLOYMENT[65]

Companies and their employees were and are confronted with numerous uncertainties and interventions due to the Covid-19 pandemic, which had significantly influenced employment. This is also reflected in the results of the online survey of innovative companies and research institutions in Upper Austria. 46.3% of the responding companies stated that they had reduced holiday balances and time credits. In a relevant share of the companies (27.3%) the number of employees had to be reduced, in 11.6% of the companies the number of employees was reduced at least temporarily. Only a small proportion of companies stated that they had accumulated time credits (10.7%), hired staff (8.3%) or increased the number of employees (3.3%).

Some of the statements made by the surveyed institutions with regard to future flexibility in their staff structure should be of great importance for economic and labour market policy measures. Some of them surveyed that in the future they would rely less on their own permanent staff in personnel matters and use outsourcing of staff or personnel leasing more

[65] *Joanneum Research, and Business Upper Austria – OÖ Wirtschaftsagentur GmbH, 2020, Standortbericht Oberösterreich 2020.*

intensively. Against this background, the development of precarious employment should be kept in mind.

Interesting are the developments in the field of action "Connected and efficient mobility" as well as in companies in the field of production. In both areas, there were above-average staff reductions (-18.8% in the field of action "Connected and efficient mobility", -16.9% in production companies) as well as above-average recruitment (+12.5% and +9.2% respectively).

This shows that the sectors (and to some extent individual companies) are very heterogeneous within themselves and have been hit differently by the crisis. This allows companies that have been less affected by the crisis to acquire skilled workers who were not available on the labour market in the pre-Covid 19 era. In contrast, among companies in the ICT sectors, 10.7% of companies reported hiring staff, while not a single responding company cut staff.

THE MEANING OF THE PANDEMIC FOR THE CORPORATE LANDSCAPE[66]

The current Covid-19 pandemic brings a host of challenges for companies that acutely challenge their ability to survive. Another major challenge are the impending sustainable changes in the business landscape (through bankruptcies or takeovers) that accompany the crisis. 58% of the respondents see this development coming in their field of business.

Likewise, highly relevant for the development of the business landscape are possible radical changes. Around 61% of respondents assume that new products, business models or competitors will prevail during or after the crisis. This assumption is particularly strong in the field of action "digital transformation" (68.2%) and in services (70.5%), as well as among around 75% of ICT companies.

Spin-offs are a Herculean task during or just before a crisis. For example, 5.3 % of the responding companies stated that spin-offs were only realised to a limited extent or not at all due to the pandemic. In the fields of action "Connected and efficient mobility" (12.6 %), "digital transformation" (7.7 %) and "systems and technologies for people" (8.5 %), an increasing number of planned spin-offs were postponed or not realised. The current situation for start-ups is also difficult. Several start-ups named survival as their current goal, which was primarily justified by the lack of funding due to a lack of turnover.

Although many companies are struggling to survive the current crisis, these adversities are not (yet) reflected in the insolvency statistics. Insolvency statistics show a decline in insolvencies in Austria from the first quarter of 2020. Across Austria, 14% fewer insolvencies were registered in the first quarter of 2020 than in the first quarter of 2019.

[66] *Joanneum Research, and Business Upper Austria – OÖ Wirtschaftsagentur GmbH, 2020, Standortbericht Oberösterreich 2020.*

The development of corporate insolvencies, which seems paradoxical at first glance, has several causes. On the one hand, public aid measures help companies to survive the crisis economically. This affects both companies that are only under pressure due to the effects of the Covid 19 pandemic and companies that already had difficulties without a crisis. On the other hand, the tax office and social security institutions, which usually file most of the applications to open insolvency proceedings, hold back during the crisis. In addition, the rules on when to file for insolvency were relaxed during the Covid-19 pandemic. Against the background of this postponement of insolvencies, a significant increase in corporate insolvencies is to be expected after the aid measures expire.

EXPECTED IMPACTS ON THE FOREIGN TRADE[67]

Upper Austrian companies assume that the COVID-19 pandemic will have a lasting impact on supply structures and market orientation. It is assumed that measures for insourcing, higher risk diversification and stockpiling as well as a shift to regional and local sourcing will take place.

MEASURES OF SUPPORT[68]

An essential element for the policy development of a region are supportive measures such as subsidies, consultations or also networking with potential partners and customers. Such measures can be used to advance strategic thematic fields and support regional institutions in national as well as international competition.

Support in networking with new partners for research and innovation as well as in developing new business fields and networking with new customers and suppliers were the most relevant support measures for companies in the context of the Covid-19 pandemic.

[67] *Joanneum Research, and Business Upper Austria – OÖ Wirtschaftsagentur GmbH, 2020, Standortbericht Oberösterreich 2020.*
[68] *Joanneum Research, and Business Upper Austria – OÖ Wirtschaftsagentur GmbH, 2020, Standortbericht Oberösterreich 2020.*

INDUSTRY IN TRANSITION CASE – AUTOMOTIVE INDUSTRY

The automotive industry is a highly ramified and interconnected industry with globally intertwined supply and end demand chains. In turn, the dependence on international supply chains meant that the industry initially had to deal with a supply shock, triggered by idle production and supply bottlenecks, followed by a sustained demand shock, due to reduced demand on the part of customers (B2B) and consumers (B2C). It can be further assumed that the resulting operating losses will be reflected in an increased decline in the number of employees. The development of the workforce is therefore directly dependent on how quickly the companies were able to resume their day-to-day business or will be able to do so again in the future.[69]

As shown in the chapter of the historical background of Upper Austria, the Upper Austrian automotive industry is one of the most important sectors. As it was with the steel metal industry in those days, nowadays, the automotive industry is under transformation through different factors such as technology developments, the current Corona crisis and increasing awareness for sustainability. In the following part the status quo of the Upper Austrian automotive industry is explained. The chapters are based on a current conducted location survey of Industrial Science Institute (IWI) and Fraunhofer Institute ISI and IAO. To conclude, the effect of the Corona crisis on the industry is analysed.

AUTOMOTIVE INDUSTRY SITUATION[70]

The automotive industry in Upper Austria is a networked factor in the overall economic structure. It not only generates sales, value added or employment in its own companies, but is also linked to numerous other domestic industries through intensive interdependencies, both on the side of its suppliers and on the side of its customers. Through their economic networking with other sectors of the economy, automotive companies provide impetus for the entire Austrian economy. In 2019 the automotive industry in Upper Austria generates a total economic turnover of EUR 19.8 billion in Austria (production value: EUR 18.3 billion; corresponds to 2.7% of the total economic share).

EMPLOYMENT EFFECTS

Up to 86,600 secure jobs in the domestic economy can be attributed to Upper Austrian companies in the automotive industry. Approximately 31,300 employees can be directly attributed to the companies of the Upper Austrian automotive industry, while indirect effects and intermediate inputs result in approximately 24,200 employees in Austria's economy and

[69] *Industrial Science Institute (IWI), 2020, unpublished study*
[70] *Industrial Science Institute (IWI), 2020, unpublished study*

a further 30,100 employees through induced effects. Expressed in full-time equivalents (FTEs), the activities of the Upper Austrian automotive industry result in 75,679 FTEs; 30,495 FTEs directly and a further 21,294 indirectly and 23,890 induced FTEs.

R&D RATE

Investments in R&D provide an opportunity to emerge as a pioneer from the transformation process of the automotive supply industry. On average, the R&D ratio of automotive companies as a whole is 12.5%, whereas it averages 16.6% in the automotive sector.

In the underlying study, the Industrial Science Institute (IWI) analyses the structural change of the Upper Austrian mobility and supplier industry. In doing so, n=89 companies participated in a survey on the topic of "Connected & Efficient Mobility". The net sample is divided into about one third large enterprises and two thirds small and medium-sized enterprises. Together, these companies generate sales of around EUR 22 billion.

STATUS QUO OF THE UPPER AUSTRIAN AUTOMOTIVE INDUSTRY[71]

In the next years, the automotive supply industry will have to adapt and further develop its market. The companies in the Upper Austrian automotive supply industry are convinced that the transformation of their current structures will be driven to a large extent by innovations and megatrends such as the digital transformation and e-mobility. This transformation will result in a change in the nature of vehicles. However, the respondents do not believe that in the future only supplier companies will manufacture systems for autonomous and urban mobility, but rather many companies along the value chain.

A closer look at the customer base of the companies surveyed in the automotive industry in Upper Austria reveals that the largest proportion of companies (81%) count OEMs (original equipment manufacturers) among their customers. Many companies state that Tier 1 (supplies directly to OEMs) are part of their customer base. Thus, three quarters of the asked companies name them as a customer. Half of the companies state that Tier 2 (supplies to Tier 1) is their customer base. Tier 2 is followed by the customer base of buyers for machinery and equipment for the automotive industry, which is named by slightly less than half of the entrepreneurs surveyed (46%). Battery technology, car body and powertrain (including subcategories) are more represented. Tier 3 (supplies to Tier 2). With regard to the sectors, mainly car body and battery producers supply Tier 3 (43% each).

[71] *Industrial Science Institute (IWI), 2020, unpublished study*

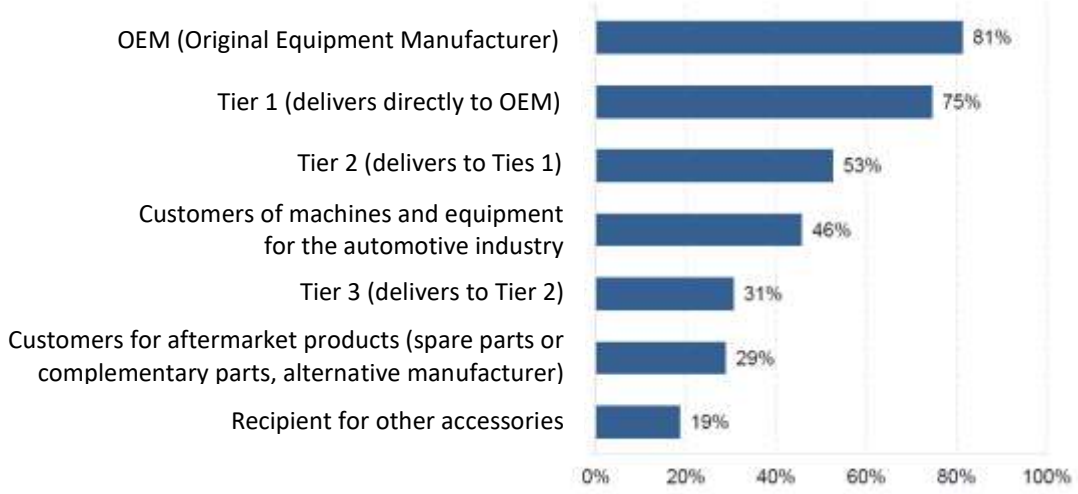


Figure 13: The customer base of the companies surveyed in the automotive industry[72]

FUTURE TRANSITION OF THE AUTOMOTIVE INDUSTRY

The megatrends of digital change and e-mobility require enhancements to the qualifications and competencies of employees. Areas such as project management, automation & artificial intelligence, process technology and information technology are important for those companies that perceive this change. The high demand for new qualifications and competencies for e-mobility with regard to vehicles/components and energy systems is striking.[73]

Companies in the automotive industry are convinced that the transformation of given structures will lead to a change in the nature of vehicles. In the future, however, the production of systems for autonomous and urban mobility will not be the exclusive domain of supplier companies, but will increasingly be offered by other companies, including those in the field of information technology.[74]

The analysis also shows how companies expect sales to develop in the future. In general, it can be said that the Upper Austrian companies surveyed expect low growth in the automotive sector in the future. Future-oriented topics in the automotive industry are characterized by the current developments in the energy transition and autonomous driving. Here, too, the companies expect sales to increase. The areas in which, according to the companies surveyed, a strong increase in sales of more than 10% is likely to occur are artificial intelligence (AI), networking for data exchange (including software) and interactive interfaces to the user. Other areas that are likely to experience strong overall sales growth within the next three

[72] *Industrial Science Institute (IWI), 2020, unpublished study, p. 19*
[73] *Industrial Science Institute (IWI), 2020, unpublished study*
[74] *Industrial Science Institute (IWI), 2020, unpublished study*

years are electrics/electronics (incl. power electronics), sensor technology, control elements, battery technology, accessories for individualization, and interiors. The areas expected to see an overall increase in sales of between 5% and 10% are services for the automotive industry, sensor technology, control elements, and exterior.[75]

The next years will see an increase in the total investment activities of the company sample. According to their own statements, one-fifth of the respondents will see a strong increase, one-third will see an increase, while around one-fifth will see no change. For the majority of companies, investment activities will involve both new and replacement investments.[76]

The strategic orientation of Upper Austrian companies is also reflected in their investment activities. For example, there is increased investment in battery technology, which will drive the further development of powertrain electrification. Increased investments are also evident for networking for data exchange (incl. software), which once again underscores the importance of future interaction and communication along the supply chains and the associated efficiency and optimization potential for the companies surveyed. Likewise, increased investment in accessories for individualization and mixed attitudes toward the future importance of autonomous shared cabs point in the direction of continued importance of individual and private vehicles[77]

However, these forecasts must be viewed in a differentiated manner in that these results represent a pre-coronary crisis status quo. Basically, it can be stated that the sample of the Upper Austrian automotive industry showed above-average positive expectations for the future despite structural change and a shrinking world market at the time of the survey. The positive expectations could be interpreted to mean that the proximity to the German market (90% of the companies supply German customers) is a decisive resilience factor.[78]

LOCATION SURVEY AUTOMOTIVE UPPER AUSTRIA[79]

SCENARIOS OF POSSIBLE FRAMEWORK CONDITIONS FOR THE MOBILITY INDUSTRY IN UPPER AUSTRIA

The study is considering the background of various challenges in the range of mobility with support of the Fraunhofer Institutes ISI and IAO as well as the Industrial Science Institute (IWI). It should demonstrate the challenges for the mobility industry in Upper Austria for the next 10 to 15 years. On basis of a critical reflection options for action are going to be developed.

[75] *Industrial Science Institute (IWI), 2020, unpublished study*
[76] *Industrial Science Institute (IWI), 2020, unpublished study*
[77] *Industrial Science Institute (IWI), 2020, unpublished study*
[78] *Industrial Science Institute (IWI), 2020, unpublished study*
[79] *Fraunhofer ISI and Industrial Science Institute (IWI), 2021, unpublished study*

In phase I trends and drivers of the transformation of the automotive industry were analysed in detail. Key figures of the status quo and the long-term viability of the Upper Austrian supplier industry were collected within an extensive survey. The trends & drivers were matched with the relevant fields of activity (from #upperVISION2030) and the eight resilient and robust fields of action emerged from this. The detected action fields are listed later on in chapter: the resilient and solid action fields.

Circular Economy	Sharing Economy and basic orientation B2C	Electrification of the powertrain in form of Battery Electric Vehicle (BEV)	Handling with mobility data	Function integration (smart materials)	Energy transition and sector coupling
Automated / autonomous driving	Framework conditions for automated driving	Platform and modular strategies	Regulating mobility services	Industry 4.0	Machinery and plant engineering for lightweight construction
Infotainment, maintenance, digital services	Hybrid lightweight construction	Additive manufacturing	Conceptual lightweight construction	Charging infrastructure for BEV	

Figure 14: Activity fields[80]

Phase II was addressed to potential scenarios. Three possible scenarios of future framework conditions for the mobility industry in Upper Austria were developed on the basis of the collected data and findings of phase I and the support of experts from business and research.

SCENARIO 1

1. The fundamental principles of circular economy shape the social values and actions. From the beginning, vehicles were designed and produced with regard to a preferably high recyclability, a sustainable structuring of the production processes, a sustainable supply of raw materials and a reduction to the principles of lightweight construction.

[80] *Fraunhofer ISI and Industrial Science Institute (IWI), 2021, unpublished study*

2. The production is fundamentally thought in a new light: digital twins allow a continuous optimization of the production, the plant engineering will focus on ambitious projects concerning material efficiency and materials will be rated on their recyclability.
3. Powertrain concepts are still evaluated and developed holistically objective and open to technology. The share of battery-powered vehicles increases slowly. Chargers are mainly located in the private area.
4. The society and a lot of different providers are dealing mobility data in an open way with the objective of reaching preferably high efficiency gains and utilization optimization in mobility on the basis of a transparent knowledge-base on the product use.

SCENARIO 2

1. The concept of sustainability shapes the decisions and is integrated into the present system with a focus on product use: materials and processes are assessed with regard to a sustainable product appearance, manufacturing technologies are redeveloped and hybrid materials are used.
2. Battery electric vehicles are gaining more and more widespread acceptance. Its fast run-up is accompanied by an intensive expansion of the public and non-public charging infrastructure.
3. There is a frequent use of sharing-concepts within the mobility sector. Other mobility services are rejected and are only authorised in exceptional cases.
4. Scepticism predominates in the area of handling of data and privacy preservation. Data exchange is strongly regulated and utility-oriented. The restraint is reflected in a slow development of automated vehicles and a persistence in the current legislative framework of autonomous driving.

SCENARIO 3

1. The passion for technology and the desire for convenient functions are predominant for manufacturers and consumers. Sustainability aspects are of much lower priority and a personalized mobility experience defines the products.
2. An implementation in the field of smart materials and hybrid lightweight construction takes place, especially driven by the proactive development performance of the plant manufacturers.
3. The own car has priority. Hybrid hydrogen options catch on instead of electric battery drives. Mobility services are further irregularly allowed.
4. Data become a business model and they are extensively exchanged. The data monopolists press ahead quickly with autonomous driving in a comfort-oriented society. With their software and applications, they define the value promise of vehicles.

THE RESILIENT AND SOLID ACTION FIELDS

As result of the study resilient and solid action fields in the automotive industry are identified. No matter which described scenario will be fulfilled the following nine action areas are necessary to be aware of:

1. LCA (Life Cycle Assessment)
2. Diversification & internationalization of markets & players
3. Autonomous Driving / Assistance Systems
4. Materials & Lightweight Construction
5. Infrastructure
6. Standardisation & Certification
7. Validation & Trustworthiness
8. Education & Training

As we are already thinking ahead to the year 2030, the automotive industry is also an important field due to our business and research strategy #upperVISION2030. With the results of the automotive study, we are entering the regular rolling process to derive concrete measures and activities with the key policy players, such as lead project development, regional call for tenders, etc.

CONCLUSIONS – GOALS FOR POLICY LEARNING

INNOCAMP36

For this part of the regional analysis the methodology of the InnoCamp36 was used to get "fresh" ideas with the help of young minds and to become more resilient as a result. The InnoCamp36 is an agile, competitive, innovation event created and organised by the Global Sales and Marketing (GSM) degree programme at Campus Steyr of the University of Applied Sciences Upper Austria. It brings together highly motivated students from different cultures and with a variety of talents and interests in order to solve future-oriented challenges proposed by dedicated companies. The serious work will be part of an inspiring event that will take place in the historic industrial ambience of the Museum Arbeitswelt in Steyr. Within a period of 36 hours, max. 8 interdisciplinary teams intensively analyse their assigned challenges, create ideas and concepts as well as discuss and develop solutions and finally present their approach to a jury in a pitch. Attractive prizes sponsored by the participating company partners will reward the best and most innovative solutions.[81]

[81] *https://www.fh-ooe.at/en/steyr-campus/innocamp/innocamp36/the-idea/*

In October 2020 Business Upper Austria has participated in this competition with the case of the project FOUNDATION posed to the students to create a shock plan for the Upper Austrian industry and recommendations for action within a Report. Our student team won the 2nd price within this event.

Figure 15: The students Biz-Up Team won the 2nd place at the InnoCamp36 in 2020[82]

RECOMMENDATIONS FOR ACTION

It is evident that Upper Austrian businesses are well-established in regard to innovation, technology and export as it is the centre for networking in terms of innovation and technology. Regarding the current pandemic, a proper resilience plan is needed for public authorities and policy makers in order to secure continuous business for SMEs in the future.[83]

BUSINESS RESILIENCE[84]

Using innovative business models makes companies resilient against crisis and therefore, helps them to become more stable against shocks. In order to identify and use the right business model, companies must be a 100% aware of the environment they are dealing with (Puganigg and Bruckmann 2020). Basically, that means to answer the following questions:

- Customer segments: Which target groups, organizations and markets should be reached?
- Value proposition: What is the added value and problem solution that we offer to the customer?

[82] *InnoCamp36, FH Steyr, 2020*
[83] *InnoCamp36, student project team, 2021, unpublished*
[84] *InnoCamp36, student project team, 2021, unpublished*

- Channels: How do we reach and communicate with our customers?
- Customer relationships: How are the relationships with our customers designed?
- Sources of revenue: Which revenue is gained by which customer?
- Main resources: Which resources are needed for operating our business model?
- Main activities: Which processes are necessary?
- Main partnerships: Who belongs to our most important buyers and suppliers?
- Cost structure: What does the operation of our business model cost?

Companies need to be aware of some risk factors when deciding about a new business model such as lack of information, inadequate liquidity planning or even unsuitable processes and tools. All of these factors can create a false big picture about the company and can lead to short- as well as long-term decision that are not resilient enough against shocks. Furthermore, companies need to protect the whole environment they operate in as well as all stakeholders they are dealing with. For example, all employees from top-down or bottom-up need to be aware of upcoming innovative changes in the structure as well as strategy and business developments. Peoples` mindset and their approaches have to be changed in the right direction. This can be done by scalable processes and tools as well as training and coaching provided by experts or role models of the company. Moreover, incentive systems can help to fasten changes within a company. An efficient and effective strategy created and identified by the whole company, which is measured by specific KPIs, can lead to a long-term resilient business model that is stable enough to maintain against economic shocks (Puganigg and Bruckmann 2020).

Every business region needs to develop a comprehensive and feasible action plan in order to respond to upcoming challenges of all types. Mostly, those master plans for the respective regions are already outdated and can therefore not be applied in today's practice of continuously changing business environment anymore. This leads to the fact that business regions are not capable of tapping the full potential of economic and research potential, which decreases, in return, the capability of adaptive responsiveness for keeping up with the times.

In order to strengthen the business region of Upper Austria and all the parties that are involved with its economic performance for future times and especially upcoming challenges that cannot be foreseen, a clear set of ideas for improvement in the four areas of digital age, sustainable solutions, human-centered technology and new mobility has been developed, that enables the region of Upper Austria to improve its actions in both flexibility and long-term oriented strategic planning while at the same time keeping in mind the growing importance of new technology trends (Business Upper Austria 2020).

ACADEMIC RESILIENCE[85]

This kind of resilience is of great importance as in our strategic programme #upperVISION2030 the education as well as the person and the professional form the centre. When it comes to resilience, you should start with the core first. Education is the place to start, so we have the confirmation that we are on the right track with the focus of our strategic programme #upperVISION2030.

In order to achieve academic resilience, Upper Austria needs to follow the global trends of the modern world, i.e., digitalization, personalization and collaboration (Zukunftsinstitut 2020). The goal is to convert the learning and teaching experience into a flexible process so that it responds to the individual and unique needs of each individual. This accompanies the society almost from the time questions were asked about whether to learn or teach in the right way (Chen 2008, pp.787–814). The following information contains practical implementations of possible future strategies.

DIGITALIZATION[86]

The first step is to implement digitalization, for instance distance learning platforms, in learning process. It will help to improve learning management systems for students and scientists. Examples of some e-learning platforms are MS Teams, Zoom, Skype, Google Classrooms, or Docedo.

Not less important is to provide high security of online learning. Website of each organization needs to be secured with a TLS (transport layer security) /SSL (secure sockets layer) certificate to encrypt information. There are three types of TLS certificates: Domain Validation, Organization Validation and Extended Validation. Certificate authorities, like DigiCert, validate each type of certificate to a different level of user trust. EV (Extended Validation) certificates provide the highest level of authentication and are the global standard for encrypting highly sensitive data. Also, implement DOE-licensed version of Zoom, which was developed by New York City Department of Education to better meet their security standards. Users can secure email through protocols like S/MIME (Secure / Multipurpose Internet Mail Extensions) and work towards DMARC (Domain-based Message Authentication, Reporting and Conformance) certification for your domain.

Focusing on digitalization of education by integrating digital tools and digital learning in education is essential in these days. In order to make people more familiar with a new digital way of education, you can organize educational lectures and courses where the main e-learning platforms will be observed. In addition, educational projects become more digital

[85] *InnoCamp36, student project team, 2021, unpublished*
[86] *InnoCamp36, student project team, 2021, unpublished*

and didactically meaningful with the aid of Artificial intelligence, special apps, surveys and videos. It will also automize processes by relieving tons of paperwork.

New communication technologies provide researchers with additional ways to distribute research results quickly and broadly. For instance, the social networking site ResearchGate can be provided to share papers, ask, answer questions as well as find collaborators. This provides raw data, computational models, the outputs of instruments, simulation tools, records of deliberations, and draft papers that can be posted online and accessed by anyone before any of these results have undergone peer review (Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, and Institute of Medicine 2009).

Furthermore, students need to be taught the competence of drawing up the documents in order to meet all the bureaucratic requirements of their university, workplace, etc. Starting from basic course requirements for class enrolments to getting access to student services. This knowledge would help to reduce stress levels and prepare students properly for their future career. Another point is also transferring to online format of documents submission with available educating tutorials which can help to understand the system better.

PERSONALIZATION OF HIGHER EDUCATIONAL LEARNING[87]

First and foremost, the education nowadays should be adaptable not only to unpredictable situations like the current C-19 pandemic but also to the needs and demands of every student. Customized learning facing each person's strengths, needs, skills and interests is essential for future schools and higher educational institutions demand.

Furthermore, it is important to define the level of knowledge, strong and weak points for the individual subject to create a better understanding of every student. The implementation will be possible by conducting preliminary, intermediate and follow-up surveys that would show the student's level of preparation as well as expectations regarding the course and will help to arrange personalized programs.

After getting a personalized learning plans, it is necessary to consider the adaptation of the schedule by including the individual needs of a student based on a conscious combination of work and studies. The curriculum should be developed and enhanced to focus on the practical part mostly. Some additional disciplines may be added in order to keep up with the demands in the labor market.

Another important point is cooperation with local companies which seek for young employees. In this case both sides would win as the students would be provided with a chance to work in the respective field they study and gain practical experiences. At the same time

[87] *InnoCamp36, student project team, 2021, unpublished*

employers would get prospective and educable employees who can be paid less than experienced ones and can also bring necessary innovations to the company. In turn, it can advise the universities what competences the student needs to get during the studies.

Considering the C-19 restrictions and their consequences, an adoptive behaviour is a very important skill in these days. It enables people to handle any kind of unexpected situations or at least be ready to become more flexible. That is why introducing students to a subject that is devoted to create a better understanding of themselves, the environment and current situation globally, would be helpful to establish stable mental health and the ability to go through problems without getting any harmful influence. Additionally, psychological support may also be a key aspect to perform successfully in any kind of conditions.

COLLABORATION[88]

Universities have a great role in innovation eco-systems. Additionally, developing human capital and advanced technologies, universities are increasingly expected to participate as economic development partners with industries and local, state, and national governments. Universities can serve as an eco-system orchestrator by applying intellectual, reputational, and financial capital strategies to establish and maintain a strong eco-system. (Heaton, Siegel, Teece 2019, pp.1-2)

An innovation eco-system is locally structured, but it is also globally branched through the network of individuals, researchers, and entrepreneurs involved in solving shared problems and emerging societal challenges. Therefore, the eco-system acts locally but its implications and impacts can have global magnitude. An innovation eco-system can be identified as a system of actors where new ideas are generated, and organizations are engaged in transformation and development processes (Schiuma 2018, pp. 2-3).

An innovation community knits together organizations of different sectors, countries and disciplines. The Innovation Hub is a main instrument for managing activities and knowledge by the European Institute of Innovation and Technology invention (EIT). The EIT's network of highly dynamic Innovation Hubs enables national and cross-border EU collaborations. Also, it offers various benefits of regional eco-systems, partners' facilities, factories, and classrooms for joint programs and projects. They are built on the existing labs, offices or campuses of some of the Innovation Community's core partners, which serve as clusters for a particular region, discipline or task. There they bring together people and teams from across the knowledge triangle for ideation, projects and other initiatives (European Institute of Innovation and Technology 2020).

Newly established firms increasingly find the existence of university-industry collaborations a powerful driver of innovation and entrepreneurship activity. Results show that universities

[88] *InnoCamp36, student project team, 2021, unpublished*

spill overs are positively correlated with innovative start-ups. Furthermore, the presence of human capital which is measured by the number of graduates exerts a significant influence on location, constituting a source for competitiveness for firms close to universities (Calcagnini 2014, pp.2-6). Facilitating researchers to start businesses based on innovative outcomes of their research projects in collaboration with Upper Austrian companies would decrease the time-to-market factor and increase the innovation impacts of the Upper Austrian region.

All in all, these aspects help to gain and increase resilience in the academic field and improve the eco-system in general by making it more flexible, innovative and safe. However, their implementation is impossible without simultaneous changes in other spheres of businesses in Upper Austria and governmental regulations regarding personalized learning and legal collaboration between higher educational institutions and business structures.

"SHOCK PLAN" FOR UPPER AUSTRIAN INDUSTRY[89]

In order to be resilient as a region for instance in times of crisis (e.g. COVID-19 crisis) a shock plan was designed. This shock plan is intended to be a kind of toolbox for regions, intuitions as well as companies on how to survive in times of crisis and beyond.

The structure of the Upper Austrian shockplan is:

1. Monitoring
2. Digital Age
3. Human-centered Technologies
4. New Mobility

MONITORING

Monitoring measurements by the government are going to be identified to ensure a dashboard that displays the resilience of the region and a Europe wide integration. For Upper Austria to become more resilient on a regional level, it is good to know how resilient companies and SME's are in the region firstly. For this, there have been some experiments for example if we look at the UK, they have had such monitoring tests in Wales they used Qui-score which is administered by the UK chamber of commerce (Soroka 2019, p. 838).

The Qui-score is a score calculated per company by the chamber of commerce in the UK it is a score that hangs together with a lot of factors the calculations are not disclosed only the end result is shared with the public it eventually is similar to the Z-score that calculates how resilient a company is and what the probability of a possible bankruptcy is within a certain company and the probability for the company of surviving (Soroka 2019, p. 848).

[89] *InnoCamp36, student project team, 2021, unpublished*

As the Qui-score is a method that is not commonly used in other countries and the way of calculation is not disclosed we would propose to use the Z-score. If you would collect all Z-scores of companies within a certain sector in the Upper-Austrian region then it is possible to map and monitor how resilient a certain sector is in the state. This enables the government to act accordingly by supporting this sector by guidance or with grants if possible.

For calculating the resilience of a certain sector, you mainly look at the fluctuations of the average Z-score within a sector. This way you can see how resilient a sector would be at any given time (Soroka 2019, p. 848).

We believe that when it is possible to monitor the resilience of all sectors it will help make the Upper Austrian region more resilient as well as their will be a clear overview of the pain points before it becomes a big problem. This should be a Europe wide benchmarking system that differs from other benchmarking dashboards as it will mainly focus on the resilience of sectors in the region.

In order to strengthen the business region of Upper Austria and all the parties that are involved with its economic performance for future times and especially upcoming challenges that cannot be foreseen, a clear set of ideas for improvement in the four areas of digital age, sustainable solutions, human-centered technology and new mobility has been developed, that enables the region of Upper Austria to improve its actions in both flexibility and long-term oriented strategic planning while at the same time keeping in mind the growing importance of new technology trends.[90]

DIGITAL AGE

UNDERSTANDING THE ENVIRONMENT AND THE PEOPLE: ADOPTING DIGITAL PLATFORM-BASED BUSINESS MODELS

Companies again need to take five critical actions, to adopt new digital platform-based business models and compete in the digital economy.[91]

- First, educate and engage the board and leadership team: Change mindsets on the new economics of the digital economy, and the impact of networks, data and AI. Fully understand how and why some companies are growing exponentially and how new digital business models can be integrated into existing operations to grow revenue. Understand implications for shareholders, both in terms of risk and reward and also dividend policy. For the business region of Upper Austria, this means that top level management must be made to change their mindset and go with the trend as well as the immense benefits of digital economy. Executives should expand their acceptance

[90] *Business Upper Austria 2020*
[91] *Falque and Ward (2020)*

and thus understand that the implementation of digital solutions can result in tremendous revenue and profit growth.

- Second, adopt a 'business model portfolio' approach to growth strategy: incorporate a new way to dynamically re-allocate capital and resources to digital and to new market opportunities, building in technology creation and network orchestration in a way that drives greater demand for the most profitable parts of your core business. Consider how new technology enables change in both the value delivery chain. This means for Upper Austria that, after the previous step of changing the C-Level management mindset, the next step will be to include new technologies in the companies' future development and growth plans. In that way, consequently, an overall improvement of the entire value delivery chain can be observed.
- Third, define a vision for growth by combining new with old business models: remember why the business exists and what its core values are, and articulate the company's mission, vision and objectives in a way that attracts new talent, retain customers and excite investors. Move thinking from linear product value chains to multi-sided models delivering improved customer outcomes through differentiated partner ecosystems. Upper Austrian companies need to adapt their growth plans and perspectives in a way that shows a healthy combination of the firm's traditional values and new, forward-thinking approaches in regard to all external factors.
- Fourth, upgrade the operating model based on a dynamic portfolio: re-configure the organization and its commercial and technical architectures to enable bold market experiments at speed and at scale that both invent the future and optimize the present. Consequently, the business region of Upper Austria needs to adapt company models in general towards a more dynamic approach in regard to workflow, processes and overall architecture. This enables to improve both the current status of the market and its future growth plans.
- Fifth, refresh your metrics: create customer and partner engagement measures that are more appropriate for a digital world, orienting corporate mindsets to the exponential opportunities made possible through 'network effects'.
- Finally, the creation of measurement tools for the engagement of third parties has to be developed for Upper Austrian businesses. In that way, a beneficial network can enable great opportunities for company development and growth strategies.

UNDERSTANDING THE OWN SYSTEM: EFFECTIVENESS-BASED BUSINESS GROWTH

According to evolutionary changes in the age of the digital economy, the new business models cannot be anything but a constant search for providing better customer service, though not in the traditional, obvious way, but rather service that is openly flexible and user-friendly and possibly even co-designed by customers themselves (Dosdoce.com 2014).

- New business models are asset light, are underpinned by customer data/insight, and use partner eco-systems for co-innovation and investment. They evolve iteratively to drive "network effects" and massively leverage scale. Furthermore, organizations looking to maximize value in the digital economy must re-balance their business model portfolio and look to disrupt their own markets. To sum it up, Falque and Ward (2020) have already mentioned, "Too much focus on operating models prevents companies from thriving in a digitalized environment." As new business models start delivering value, they spawn operating models which can also be improved and optimized using digital technology. Effectiveness-based business growth absolutely must take priority over efficiency-based operations.
- The business region of Upper Austria should learn from those statements that keywords such as co-creation, network effects and customizability are crucial topics when it comes to the development of a new business model. Instead of focusing the model and its processes and subprocesses on a too high level, it is rather recommended to keep an eye on the involvement of the customers themselves in nowadays' digital and fast-moving economy. Only in that way, Upper Austrian businesses are capable to compete in the continuously converting and highly competitive markets of the current times.

HUMAN-CENTERED TECHNOLOGIES

- Taking the know-how of Upper Austria in terms of technology and develop it further in order to gain national and international recognition as the region for human/machine competences to get in the technology pioneer position.
    - Investing in research and development in the fields of robotics and artificial intelligence in order to stay in the pioneer position.
    - Especially in the fields of production and manufacturing, the connection of human/machine is beneficial as it increases productivity and lowers the failure rate.
    - In the next step, transferring those technologies used in production and manufacturing into the health care segment in order to digitalize the medical sector as this is a field which is constantly developing also.
    - Companies could cooperate more with universities in order to develop new technologies. Hence, students get a direct practical insight and companies get the scientific knowledge.
- Creating awareness and acceptance of new digital technologies helps to implement innovations in companies in the first place. Secondly, as it is internally accepted, it helps to enhance the company's profile externally i.e., innovative, and technology driven.
    - Firstly, new technologies should be fully accepted from the top management.

  - Provide sufficient trainings to the personnel regarding new digital technologies in order to gain trust and acceptance.
  - Possible ways to create awareness and gain technological acceptance is to go to fairs or to expositions in the respective fields. Hence, employees can get in touch with the innovation through a playful way.
- Business processes of SMEs should be more digitalized. Hence, access to several IT-solutions such a Cloud services, collaborative platforms like Microsoft Teams or also video chat solutions should be given.
- In being able to act more flexible, a Rent and Lease model should be implemented for SMEs in order to create better access to new technologies which are more expensive when purchasing. This approach intends to support SMEs. Given the lower capacity and cost of capital compared to giant corporations, this approach would be a very good one.

NEW MOBILITY

As described in the chapter industry in transition, new mobility models are necessary to be in line with the megatrends and to gain a competitive advantage. To master the new challenges of those days and also the future resilience is essential for all companies.

CONCLUSION

Based on the economic history, Upper Austria developed to Austria's number one industrial province. In order to deal ideally with the fields of competences and the economic crisis, strategic programs were created and already have a long history in Upper Austria. #upperVISION2030 is the current strategic programme processed in Upper Austria. Specific fields of action, where the human and education are in the centre, are going to be implemented until 2030. One of these fields also handles with the Upper Austrian industry. In times of the current crisis the Upper Austrian industry is affected. Especially the Upper Austrian automotive industry which serves as industry in transition case study in the underlying regional analysis. Together with the InnoCamp36 student team a shock plan for Upper Austria was elaborated in order to foster the location resilience and strengthen the business location.

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