



CORRIDORS AND TECH REGIONS: INTERNATIONAL CASE STUDIES



GREATER MUNICH

GREATER MUNICH: GERMANY'S LEADING SCIENCE, TECHNOLOGY AND MANUFACTURING REGION

Munich is Germany's most productive urban centre and is a leading German metropolitan region for high-tech activity, with a powerful innovation system. Like Silicon Valley, the microelectronics industry was stimulated by defence spending and technology.

Over time, Munich's economic development has spread across a wider region, with the city itself no longer able to concentrate all major functions. Rising land costs in the urban core led to a 'metropolitanisation' of development.

High ranking for quality of life and performance. Munich ranked fourth in the 'Mercer Quality of Living Ranking 2014', was ranked the seventh best performing European city on AT Kearney's 'human capital' benchmark, and seventh globally for innovation.

In the 1980s and 1990s, Munich and Bavaria pioneered new innovation and technology policies. A number of valuable programmes sought to build its high-tech sector strength by supplying specific R&D, training and infrastructure for the life sciences, ICT and mechatronics sectors among others.

Industrial diversity is one of Munich's greatest strengths. High-tech industries and knowledge-intensive services sit alongside traditional production.

Munich's inherited infrastructure platform is very strong, both in terms of public transport and international connectivity.

The city is rated in the world's top five for electricity, water, transport and telecommunication systems, and these play a part in sustaining high quality of life. The re-development of Munich's airport has allowed it to become Lufthansa's second most important hub after Frankfurt.



GREATER MUNICH

INTRODUCTION

Munich is a leading German metropolitan region for high-tech activity, with a powerful innovation sector. Its economy grew rapidly in the post-World War II period and is now, arguably, Germany's 'Silicon Valley', with dominant positions in electronics and advanced manufacturing. Despite the lack of a formal tier of regional metropolitan government, much of Munich's success in innovation and high-tech industries has been attributed to close working between state-level and city-level government and active state policies. However, several issues are increasingly demonstrating the need for better intra-regional collaboration to ensure that Munich retains its competitive advantage.

Greater Munich is one of eleven metropolitan regions in Germany, consisting of the agglomeration areas of Munich, Augsburg, Ingolstadt, Landshut, Rosenheim and Landsberg am Lech. It is located within the state of Bavaria, in southeast Germany, and is Germany's fifth most populous metropolitan region. The city of Munich dominates the metropolitan region both in terms of population and economic strength: it accounts for approximately two per cent of the land area but around 30 per cent of the population and 40 per cent of employment. Home to around 1.5 million people, the city of Munich is Germany's third largest city after Berlin (3.5 million) and Hamburg (1.8 million).

Munich is Germany's most productive urban centre and is a leading German metropolitan region for high-tech activity, with a powerful innovation system. Much like Silicon Valley, Greater Munich evolved rapidly from an agrarian to high-tech economy in the decades following World War II. Soon after WWII, Munich received an influx of skilled refugees, federal research agencies and large firms from Berlin and Eastern Germany, with companies such as Siemens relocating to Munich, partly as a result of high war reparations imposed in the Soviet sector.

This catalysed the formation of a critical mass of banking, insurance, media and manufacturing firms – including BMW and Allianz – and helped build technological capacity and shape in a city that had ample land to grow. Munich soon acquired a reputation as a consummate automotive/aerospace centre and insurance provider.

In subsequent decades, as with Silicon Valley, a great deal of Federal defence spending was directed towards the Munich metropolitan region, laying the foundations for the microelectronics industry. West Germany's commitment in the 1960s to technologically-oriented armed forces saw a rise in investment in weapons research and development, and Munich was chosen to host one of only two federal research universities tied to the army. As the city became a magnet for talent, it forged international expertise in electronics and advanced manufacturing, producing a host of globally successful products for export.

During the 1960s and 1970s, Franz Josef Strauss (chairman of the Christian Social Union, member of the federal cabinet in different positions and long-time minister-president of the state of Bavaria) helped rebuild Munich's

universities, and secured the long-term presence of key public research institutes. In 1972, Munich also hosted the Olympic Games, which triggered significant physical development in the city.

In the 1980s and 1990s, Munich and Bavaria were pioneers of new innovation and technology policies. A number of valuable programmes sought to build its high-tech sector strength by supplying specific R&D, training and infrastructure for the life sciences, ICT and mechatronics sectors among others. The Bavarian Innovation Programme and Bavarian Technology Introduction Programme helped with technology transfer, and were followed by the €3 billion Future Bavaria Initiative (1994-1999) and the €1.4 billion High Tech Initiative (1999-2006) which deployed money from the sale of public utilities. Cumulatively these schemes built a prodigious array of research facilities, start up centres and university spin offs.

However, Munich's economy also faced a series of economic shocks during the 1990s:

- Reunification in 1990: there was concern that the industries and organisations that had moved from Berlin might return to the new capital and that Germany's axis of development might shift from North-South to East-West, from Berlin to the Ruhr, bypassing Bavaria.
- End of the Cold War: during the Cold War period, Bavaria invested heavily in developing defence and aerospace industries, many of which were concentrated in and around Munich. After 1989, these industries experienced a severe drop in demand (later adjusting to take advantage of the peace dividend).
- Economic downturn 1993-94: this dealt a further heavy blow to the export-orientated industries at the heart of the Bavarian economy: the automotive industry, and electronic and mechanical engineering, with a measurable increase in unemployment during these years.

Gross Value Added (GVA) per capita and patenting rates fell in the region during the early 1990s. However, these challenges presented opportunities to refresh the metropolitan region's economic basis, and to engage with emerging ideas and technologies – in particular, staying ahead on innovation and using the innovation ecosystem to restructure the economy and secure long-term growth. This meant:

- Promoting innovation, and through this, long term economic growth;
- Growing a new economy by pushing innovation, and identifying and promoting 'future winners';
- Growing a greener economy – promoting innovation in green goods and services, and developing markets at metropolitan region level.

Over time, Munich's economic development has spread across a wider region, with the city itself no longer able to concentrate all major functions. Rising land costs in the urban core led to a 'metropolitanisation' of development, e.g. the German Aerospace Centre, Oberpfaffenhofen, and Society for Radiology both expanded into suburban neighbourhoods. And a new urban and regional rail system (opening in 1971, in time for the Games) and an expanded, relocated airport (opening in 1992) provided the infrastructure for the metropolitan region's outward push.

THE ECONOMY AND RATIONALE FOR SPATIAL INTEGRATION

Strong economic performance

Munich has one of the strongest-performing economies in Germany. In 2012, Munich city produced €83.5 billion in GDP while the wider region produced €247.8 billion (equivalent to 52.3 per cent of Bavaria state's GDP and 9.4 per cent of Germany's GDP).

Productivity rates are high. In 2012, GDP per employed person totalled €82,700 in Munich city and €82,100 in the Munich region, compared to €68,100 across Bavaria. In 2014, per capita purchasing power totalled €29,900 in Munich, compared to the national average of €21,400.

Munich is the second-largest employment centre in Germany and has the highest employment rate of all German cities with 500,000 or more inhabitants. Munich ranked first of 69 large German cities on IW Consult's 'City Rankings 2014', which is based on economic and structural indicators to assess the level and dynamism of economic development and prosperity.

The administrative district of Munich ranked first of 402 administrative districts in Germany in 'Prognos Future Atlas 2013 – Germany's Regions Compete for the Future', which assessed the economic situation and development in rural and urban administrative districts in terms of demographics, the labour market, competition, innovation, prosperity and social conditions.

The City of Munich also ranks highly in comparison to other international cities. Munich ranked sixth in the 'European Regional Economic Growth Index 2014' (LaSalle Investment Management), which assessed 294 regions in 32 European countries on their short- to medium-term development potential. Munich ranked fourth in the 'Mercer Quality of Living Ranking 2014', which assessed 223 cities worldwide on their quality of life, based on political, social, economic and environmental considerations. In 2014, Munich ranked as the seventh best performing European city on AT Kearney's 'human capital' benchmark, and seventh globally for innovation.

Diverse range of industrial strengths

One of Munich's greatest strengths is that no one industry dominates: high-tech industries and knowledge-intensive services sit alongside traditional production. Together with information and communication technology and automotive engineering, industries such as medical engineering, environmental technology and aerospace are also strong market drivers. Munich is a prominent media hub and a centre of the southern German finance sector. It ranks as Germany's number one insurance venue and is the location of six blue-chip corporation headquarters listed in the Dax 30 index.

The metropolitan region is notable for the fact wealth is very evenly distributed between the City and the region, even though global functions are mostly based within Munich itself. The term 'Munich Mix' stems from the broad range and effective balance of economic activities in the metropolitan area, where large globally

oriented firms and SMEs complement each other, making it a 'cluster of clusters' in which no sector is overly dominant – which in turn helps to keep the city resilient and crisis-proof.

Significant global trade

Munich's balanced economic structure includes a strong focus on exports. around 20 per cent of Munich's workforce is still occupied in export-led manufacturing. In 2013, Munich's manufacturing industry had an export rate of 74.1 per cent (the value of exports as a percentage of turnover). The export rate was particularly high in the manufacture of IT, electronic and optical products (78.2 per cent). Major exports from the region include Machinery, Vehicles, Chemicals, Metals, Food stuffs and Textiles.

Export-oriented specialisations have been key to Munich's global orientation. The automotive industry was one of the first to globalise, led by giants such as BMW, Audi and MAN, while the aerospace industry did the same soon after. Vehicles account for nearly a third of Bavaria's exports, ahead of electrical equipment and machines. In total, Bavaria still accounts for more than 1.2 per cent of global exports, with the main markets being the US, China, Austria, France, Italy and the UK. Other specialisations include finance, which harbours global giants such as Allianz, Munich Re, and DAS. Within ICT, Munich can also boast a strong global reach with companies such as Microsoft, Google, Amazon, Intel, Adobe, Siemens and Telefonica.

Major European Centre

Munich is the third largest office location in Europe after London and Paris, with 22.5 million square meters of existing office space. Munich was also rated the second best real estate investment prospect in Western Europe in 2014, having been consistently among Europe's most attractive cities for international investors for the last five years¹. The city continues to attract investment from major pension and institutional funds worldwide, including from the US, because of its stability and economic progress.

Around 90 of the 1,000 largest companies based in Germany are headquartered in Munich. Large companies with headquarters in and around the city include: manufacturing and engineering companies, such as Epcos, Infineon, MAN SE, Siemens, MTU Aero Engines, Krauss-Maffei, Arri and Osram; insurance companies, such as Allianz and Munich Re; automotive company, BMW; mass media company, ProSiebenSat1Media; and technology companies, such as Microsoft Germany and Oracle Germany.

Key industries and the knowledge-based economy

The metropolitan region has identifiable clusters in high-tech manufacturing (automotive, space and aerospace, ICT and biotech), knowledge-intensive services (finance and insurance) and the creative sector (media, software and internet publishing). Key clusters include the following:

Mechanical Engineering/Automotive

Linked to the car manufacturer BMW, the mechanical engineering/automotive cluster is of great importance to Munich. Other large companies in this cluster are the headquarters of MAN and Meiller-Kipper. The cluster is characterised by a supply chain of SMEs and is especially strong in the fields of automobile multimedia and automobile IT.

¹ ULI (2014) 'Emerging Trends in Real Estate Europe.'

TEN LARGEST COMPANIES IN MUNICH (2016)		
Employer	Sector	Munich-located employees
BMW	Automotive	34,500
Technische Universität München	Education	9,800
Stadtwerke München	Utilities	9,700
MAN SE	Engineering	9,200
Siemens	Engineering	9,000
Allianz	Insurance	8,500
Linde AG	Engineering	8,000
Munich Airport	Transport	7,500
Munich Re	Insurance	3,600
Stadtsparkasse München	Banking	3,000

Electronics/IT

With its Munich headquarters, Siemens is the anchor company in the electronics/IT technology sector. Microsoft also built its German headquarters in the North of Munich while General Electric concentrated its European R&D activities in the Munich region. Company officials said this was due to the excellent infrastructure, the existing strength of the IT cluster, and in order to be close to the market. Apple, Sun, Motorola and Oracle have also chosen Munich as the location for their German head offices. Munich accounts for 41 per cent of the nation's entire market volume in the IT-Industry. Telecommunications is also an important sector, with more than 100 companies operating in the city-region, including O2 and BT Germany.

Financial Services

Munich's financial sector plays a critical role in serving the metropolitan economy. Munich has the top position in Germany as an insurance centre and ranks just after Frankfurt as a banking centre. The city specialises in banking, insurance, asset management, and venture capital financing, and hosts major companies such as the Allianz Group, Munich Re (the world's biggest re-insurer), DAS (Europe's biggest legal protection insurance company), Unicredit and the Bavarian Insurance Chamber. Two of the six largest German banks have their headquarters in Munich. Many investment companies and major private suppliers of venture capital are also located in Munich, with Munich having the largest concentration of venture capital companies in Germany.

The city's national and international financial importance has spurred a global business services presence – in audit, tax, consulting and corporate finance. Many of Munich's public-owned banks support low-income housing, SMEs and local economic development in the region. This formula makes Munich an 'established transnational' financial hub, rated 37th in the 2014 Global Financial Centres Index, and among the top ten in Europe.

Healthcare/Medical

The clinical institutes of the Ludwig Maximilian University and the Technical University of Munich are extremely important both for medical research and teaching in Germany. The medical cluster also comprises a strong pharmaceutical industry. The strength of medical technology is based on the importance of the health sector,



with a strong local market and an innovative high-tech environment. One characteristic of medical technology companies in Munich is that they are leading in IT-applications.

Munich has also become one of the major locations for biotechnology in Europe and is the leader in this field in Germany. A number of factors have contributed to Munich's success, particularly the proximity of high level scientific research institutes, an excellent infrastructure, a sufficient supply of capital, role-models in the form of firms that have already attained success, and highly-qualified employees. Bodies that assist in the transfer of technology also help to successfully commercialise research ideas.

Aerospace

As with other European aerospace regions, Munich had to face the challenge of structural changes – from military to civil – in this sector. Despite the fact that some smaller companies in the region vanished, Munich could participate in the success of Airbus, because the European Aeronautic Defence and Space Company (EADS) has an important branch in the Munich area. Greater Munich is also home to Germany's Centre for Aviation and Space Transport Research Centre, the nation's largest R&D complex in this field. The Satellite Observation centre is also located in the region.

Education/Research

This is a strong argument for the location of R&D intensive industries in Munich, with the high skill levels of Munich's labour supply being one of the most important strengths of the economy. There are world-renowned universities, professional schools and research facilities located in the city. The technology-orientated branches of the universities have also developed a tradition of close co-operation with Munich-based companies.

Publishing/Media

Munich is the largest publishing city in Europe and is one of the biggest book publishing cities in the world. It is home to Süddeutsche Zeitung, one of Germany's largest daily newspapers. The city is also the location of the programming headquarters of Germany's largest public broadcasting network, ARD, while the largest commercial network, ProSiebenSat1Media AG, is headquartered in the suburb of Unterföhring. The headquarters of the German branch of Random House, the world's largest publishing house, and of Burda publishing group are also in Munich. The Munich media sector also comprises a large number of audio-visual media companies and advertising.

Creative Industries

Munich is an important location for fashion design, with its own design school for fashion and a number of private fashion schools. Munich is also one of Germany's most important locations in theatre and music, particularly classical music (Munich has one of the most renowned opera houses in Europe). Munich is also a centre for film productions. The Bavaria Film Studios, located in the suburb of Grünwald, are one of Europe's biggest and most famous film production studios.

Munich's economy is driven by a strong innovation system

Technological know-how, outstanding education provision, and high levels of human capital have made it Germany's leading technology city. In 2007, the metropolitan region had Germany's third-largest share of patenting activity and produces 10-15 per cent of Germany's patents. It also had by far the largest shares of biotech (20.4 per cent), ICT (18.5 per cent) and 'cleantech' (15.4 per cent) patenting of all regions.



The innovation system is underpinned by several factors:

- 1) **The metropolitan region has high human capital**, with an above-average share of graduates. Munich is Germany's second-largest university city, with almost 112,000 students, of whom 15.8 per cent are foreign students. Munich has two of the nine elite universities awarded Germany's 'University of Excellence' standard (Ludwig Maximilian University and the Technical University of Munich). Munich also has a strong public school system – 40 per cent of students qualify for university entry, almost double the Bavarian average.
- 2) **Munich has a critical mass of public research activity, not only in universities, but in numerous public research institutes.** Besides the headquarters of the Fraunhofer-Gesellschaft, (Europe's largest applied research organisation), Munich also houses the Max Planck Society, (its headquarters and three institutes around the city in Biochemistry, Neurobiology and Psychiatry), the Helmholtz Zentrum Muenchen (German Research Centre for Environmental Health) and a key branch of the German Aerospace Centre. Around 33,000 people are employed in these agencies, helping to give the metropolitan region Germany's highest number of R&D employees, with over 55,000 full time equivalent (FTE) positions in 2008. Many of Munich's specialisations have developed because of very close links between companies and teaching institutions, and because of good availability of capital and technology transfer.
- 3) **Third, the metropolitan region's very diverse industrial structure/'Munich Mix' has helped to produce 'institutional thickness'**, i.e. the 'ensemble of local social and cultural conditions conducive to economic growth'. The key elements are a) strong institutions b) high levels of interaction c) sense of common purpose and d) co-ordinating activity. Munich has all of these elements in place and can profit from Bavaria's overall interconnectedness of interests.

Innovative activity is reflected in entrepreneurship, as new ideas are spun out into new firms, with above average start-up rates in the city. Munich metropolitan region's R&D share is also much higher than the state or national average while Munich's share of high-skilled science and technology workers is higher than regional or national comparators.

Munich's large firms play important roles in the innovation process. Many are world-class with significant in-house R&D facilities. They are also embedded in the metropolitan region's spatial clusters, and evidence shows they have an important 'halo effect' on local SMEs – via supply chain relationships and wider collaboration. Inter-firm collaboration within the metropolitan region has been important in the development of both knowledge-intensive business services and biotech.



ENABLING ASSETS, INFRASTRUCTURE AND POLICIES

Enabling assets

The 'Munich Mix': A balanced economic and employment structure is one of Munich's most valuable assets. During the last few years several sectors have undergone economic crisis and industrial restructuring. To date these crises have been overcome without major impact in the labour market, due to Munich's diverse sectoral mix, the location of strategic functions (like headquarters) and the high export orientation of both the manufacturing and services industries.

Responsive education system: Munich has a remarkable network of higher education, research, cultural and scientific institutions that together support one of Europe's most highly qualified labour markets.

Munich's firms have few challenges accessing skilled workers because of strong connections to skill suppliers. Large companies, employer associations and universities have become viewed as best placed to understand the right kind of people the city needs to educate and attract. There is a profound dialogue between them and the designers of the well-funded school system, which enlists and integrates companies and universities as stakeholders in the city, placing knowledge-generating institutions and innovative thinking at the heart of urban decision making.

Although Munich's university attainment rate is not outstanding, at 37 per cent (London 63 per cent, Copenhagen 47 per cent, Madrid 46 per cent, Paris 42 per cent), the employment rate of young people and women is one of the highest in the EU. The responsive education ecosystem allows Munich to create a mid-skill, technical workforce that continually sustains its manufacturing prowess. The curriculum in vocational skills training offers Munich's mid-ability students wide access to high-quality on-the-job apprenticeship training, combined with classroom tuition — as part of the so-called German 'dual system'. Approximately 250,000 students are in vocational training in Bavaria, nearly as many as are in higher education.

Infrastructure: Munich's inherited infrastructure platform is very strong, both in terms of public transport and international connectivity. The city is rated in the world's top five for electricity, water, transport and telecommunication systems, and these play a part in sustaining high quality of life. The re-development of Munich's airport has allowed it to become Lufthansa's second most important hub after Frankfurt. Its regular flights each week to North America and emerging regions such as China and the Gulf have fostered strong trans-continental business connections.

Enabling infrastructure

Connectivity is critical within the metropolitan region, which consists not just of Munich and its periphery, but several other second tier cities within 60-80km. As such, metropolitan region leaders have not only needed to connect Munich to its hinterland, but also to connect all firms in the metropolitan region to international markets, and to support the metropolitan region's gradual densification of the outwards from the core. Munich's location also makes it a major transportation hub for goods travelling from the north to south and east to west of Germany.

The State of Bavaria has dedicated significant resources to build crucial metropolitan infrastructure. A number of investments have been key: a new urban and regional rail system (opening in 1971, in time for the 1972



Olympic Games), upgraded rail lines linking Munich via Augsburg and Ingolstadt to Germany's high-speed rail network, a series of high capacity motorways, and most notably, Munich's relocated airport (opening in 1992).

A recent study found that, out of Germany's seven largest cities, Munich has the best local public transport offering². The city centre's modern and efficient public transport system consists of a U-Bahn (underground railway), S-Bahn (local railway), trams and buses. The combined U-Bahn and S-Bahn networks boast a total of 27 lines running over 500 kilometres with more than 140 stations. Munich's main railway station, München Hauptbahnhof, moves over 350,000 passengers per day, making it the second largest station in the country. The station operates frequent Eurocity and Intercity trains to Hamburg, Frankfurt, Berlin and numerous other European cities, alongside extensive regional services to surrounding areas. The seamlessness of intra-regional transport prompted Siemens to describe Munich as 'the model for cities pursu[ing] the path of achieving a nearly carbon-free future over the coming decades.'

Munich Airport (the award-winning Franz Josef Strauss International Airport) – which lies 30 kilometres north east of the city centre and serves around 40 million passengers a year – is the second busiest in Germany, seventh largest in Europe, and 14th busiest in the world in terms of international passenger traffic. Flight schedules serve over 220 destinations in 65 countries. The prestige of becoming Lufthansa's second air gateway has opened up vital new links with Shanghai, Sao Paulo and Dubai among many others, providing the whole of the metropolitan region with new diverse market opportunities. The airport has undergone dynamic growth over recent years and, to keep up with demand, is planning a third runway.

Despite a strong transport system, new connectivity challenges have appeared. In the wider Munich region, urban sprawl has created congestion and unproductive commuting patterns. The airport's 45-minute rail connection to the city centre is also a strategic deficit.

Enabling policies

'Active state approach'

Greater Munich has a long track record of being forward looking. The shifting dynamics of Europe in the late 1980s/early 1990s led Munich to fundamentally question the continued effectiveness of its path to growth and prosperity for most of the twentieth century and, as a result, to realign its focus and objectives. Hence, Munich strengthened its presence in science and advanced manufacturing while diversifying into new industries, notably biotech and, increasingly, 'cleantech' activities such as green energy and low-carbon vehicles.

State government led the process of enhancing innovative capacity following the low point of the early 1990s. Exploiting strong public institutions and public-private networks, State and Metropolitan Region leaders developed a powerful twenty-year innovation strategy. This was delivered through overlapping initiatives to spark idea flows, grow high-tech firms, invest in education and infrastructure, and green the economy.

Three key programmes by the State of Bavaria – the Future Bavaria Initiative in the 1990s, the High-Tech Initiative in the early 2000s and the 2006 Cluster Programme – helped push Munich forward. The Future Bavaria Initiative made a big impact in adapting Munich's innovation potential and reducing the city's

² As referenced in 'Munich as a Business Location: Facts and Figures 2015' (City of Munich Department of Labor and Economic Development).



vulnerability to structural shocks. The programme has been followed by specific injections of investment into high-tech and sciences clusters, often using funds from the privatisation of electricity and telecoms systems.

More broadly, three key factors contributed to Munich's recovery and growth:

- I. **Its economic diversity and world-class firms**, which have provided economic resilience and sparked new ideas.
- II. **Critical public investments**, particularly in human capital (through the public education system) and infrastructure (especially the airport). Behind this second factor is Germany's cultural emphasis on vocational education, exemplified in Munich's training programmes. Academic and vocational education are organised as a 'dual system', provided jointly by the state, the city and by private enterprises offering practical training. Munich is the only German municipality that runs its own schools. As above, investment in physical infrastructure has also been important in supporting economic activity.
- III. **Institutional thickness**, i.e. close networks between private and public sectors; strong and stable public institutions; political leaders committed to investing in technology and innovative capacity; and the clear sense of common purpose and desire for innovation. Behind this third factor, Germany's 'active state' approach (a top down approach which has focused on innovation, knowledge and high-tech sectors) has allowed Federal, State and city public agencies to make and shape new markets, especially in the green economy.

Looking forward, city leaders are focused on two main economic development fields. The first is 'e-mobility' – a cluster of activities including low-carbon and electric vehicles, electric car grids and the next generation of high-speed rail. The second is 'future infrastructure' – the city plans to have 100 per cent renewable electricity supply by 2025, and Stadtwerke Muenchen (Munich's utility company) is developing an ultra-fast fibre optic network in anticipation of future commercial and household demand.

Governance

Unlike many other city-regions, Munich does not have formal metro-level leadership or institutions. Rather, the metro economy is co-ordinated from above (at state government level) and below (at city government level). State governments in Germany are leading actors in economic development, controlling budgets for education, R&D, culture and media. Indeed, Bavaria has led the process of promoting innovation and stimulating long-term growth in a context where state economic development activity has disproportionately affected Munich because of the spatial clustering of high-value activity in the metropolitan area.

At city level, Munich has a number of important functions, such as those relating to land management and planning, support for start-ups and providing business space, city marketing and branding. The city has an activist planning regime, aiming to be 'compact, urban and green'. The cheap purchase of ex-military sites in the early 1990s, part of the peace dividend, provided it with an important strategic land portfolio during the implementation of the above innovation initiatives. As the city government recognises the value of maintaining a mix of uses, including small craft and manufacturing businesses which are regarded as the basis for advanced manufacturing, it seeks to provide spaces for such uses to avoid a mono-functional city centre as well as to provide for companies in future sectors, rather than rely on industries that risk becoming uncompetitive. To this end, it devised a strategic land management tool in 2000, the so-called 'industrial and commercial land development programme'. It is based on two main approaches: to help preserve existing uses and to develop inner city land for commercial use as replacement for losses incurred. This strategy extends to areas for 'new



economy' uses: IT, media, biotech etc., and may involve mixing zones for traditional and 'new' industry to allow for synergies between the two.

Despite the 'institutional gap', political and business leaders have been extraordinarily successful at articulating a clear vision and programmes. Munich benefits from an environment in which many different institutions and civic leaders and entities believe they can contribute to a growth agenda, and have a high propensity to take the initiative to win political support. Importantly, local firms are seen as stakeholders and allies whose concord with local policy will bring sponsorship for cultural or social events. Regular engagement of residents also ensures a high degree of consent to the city's economic direction.

However, there are indications that the historic city-state relationship is no longer as positive. Munich's evolution into a city region due to space constraints, industrial dispersion, and suburban population/housing growth has required residential, commercial and transport infrastructure to be extended. However, the fragmented nature of Munich's metropolitan governance has delayed efforts to integrate land-use and transportation planning, and led to a rise in car dependency and congestion.

In 2008, the Europäische Metropolregion München was formed to stimulate intra-regional co-operation. The EMM has endorsed a range of projects such as high-speed rail and multi-modal ticketing, but there remain problems of fragmentation, cultural differences, and lack of public awareness of metropolitan scale. Wealthy municipalities tend to put their own interests first, and their reliance on property and payroll taxes have made them unwilling to contribute to the costs of growth. The voting constituency of the Bavarian government, where the Christian Social Union party has been in power since 1945, does not encourage it to prioritise effective metropolitan regional urban planning. In this respect, Munich's lack of functional metropolitan government means that it has made less progress than the other leading German regions of Stuttgart, Frankfurt and Hannover.

CHALLENGES

While Munich is a thriving metropolitan region, many of its biggest advantages are the product of previous cycles of investment, leadership and innovation. Much of the capacity created by these cycles of success has been used up, and there is a need to renew the productivity and innovation system in light of global competition.

As one of Europe's principal growth regions, Munich faces substantial population growth and spatial management challenges as it runs out of easily developable space within its city boundaries. Developable land scarcity has led to housing-building rates which are insufficient to meet high demand, high property prices, increased pressure on road networks (especially as high house prices have pushed some workers outwards), and restrictions on the ability of ethnically diverse, low-income and youthful populations to settle in the city. The task to build denser urban districts, based on smaller housing unit sizes, is meeting political resistance from local residents. To maintain its quality of life advantages, the city will need to address the issues of density and accessibility carefully.

These challenges have highlighted the need for both new spatial models and better collaboration with largely residential neighbouring municipalities, with whom the city currently lacks a shared metropolitan tier of government. A metropolitan alliance is not immediately likely because of different appetites for growth,

different political complexions and attitudes towards self-rule. The existing system of co-operation, the Munich Regional Planning Association, does not cover the whole functional urban region, and has struggled to devise common approaches. Munich therefore risks entering a low-co-ordination, low investment equilibrium that could damage future competitiveness. The City therefore requires the State of Bavaria to take a leadership role to strengthen the inter-municipal relationships that can ensure the supply of new residential, commercial and transport functions beyond city boundaries.

Another of Munich's challenges is to continue to adapt and avoid complacency. Commentators note that Munich does not watch the global competition as closely as other cities do, and has not taken any clear message from the rise of Asian innovation cities. The city could prepare for increased competition by encouraging the use of the city as a test-bed for new commercial solutions, and supporting new economic development experiments. Munich's future adaptability will also depend on strengthening its universities which are slightly under-funded compared to international rivals, and on growing the international student base further to ensure a robust supply of qualified workers. Indeed, high demand for labour means that the city already faces a skills shortage of over 100,000 workers, and its high value-added economy depends on staying open to international talent. This issue may intensify in the years to come — with potential strains on integration and cohesion.



REFERENCES

- City of Munich Department of Labor and Economic Development (2015) 'Munich as a business location. Facts and Figures 2015.'
- Clark, G. and Moonen, T. (2014) 'Munich: A globally fluent metropolitan economy.'
- Colantonio, A., Burdett, R., and Rode, P. (2013) 'Transforming Urban Economies: Policy Lessons from European and Asian Cities.'
- Duell, N. (2006) 'Ideopolis: Knowledge City Region: Munich Case Study.'
- Rode, P., Nathan, M., Von Streit, A., Schwinger, P. and Kippenberg, G. (2010) 'Munich Metropolitan Region. Staying ahead on innovation.'