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The Role of Startups in Driving Economic Growth in Germany: Opportunities and Challenges in 2025

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Abstract:

This study delves into the transformative role of startups in shaping Germany's economic future by 2025. Startups are positioned as dynamic engines of innovation, addressing global challenges like climate change, energy sustainability, and technological disruption. Despite their pivotal role, these ventures face significant hurdles, including restrictive regulations, funding shortages, and a talent gap. The research highlights the evolution of Germany's startup ecosystem, transitioning from a "Silicon Valley copycat" to a unique "Silicon Allee" model. Through a comprehensive analysis of industry-specific challenges and opportunities, this study provides actionable insights into the strategic measures required to strengthen this ecosystem. Employing a descriptive-analytical methodology, the study incorporates data from leading reports, surveys, and international comparisons to identify trends and best practices. Key findings underscore the potential of startups to revolutionize sectors such as digital technology and sustainable energy while driving job creation and GDP growth.The study concludes with targeted recommendations for policymakers and stakeholders to harness the full potential of startups as catalysts for sustainable economic development in Germany.

Key words: Startup, Ecosystem, Sustainability, Technology, Germany.

JEL Classification Codes: D19, H32, Q01, Q57.

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Introduction :

Preface

Germany is home to some of the world's most innovative and successful corporations, yet the role of startups in driving economic growth has become increasingly significant. Over the last decade, established companies have struggled to generate substantial job growth, prompting a shift in focus towards startups as dynamic engines of innovation and employment. These small enterprises, often at the forefront of technological advancement, play a pivotal role in addressing challenges such as climate change, energy consumption, and demographic shifts.

Startups in Germany have become essential contributors to industrial research and development, with many pioneering breakthroughs in sustainable technologies and digital solutions. Despite these advancements, the German startup ecosystem faces several structural hurdles, including a lack of funding, regulatory complexities, and talent shortages. Addressing these challenges is crucial for fostering an entrepreneurial environment that supports economic resilience and global competitiveness.

Problem Statement:

Amid these dynamics, a critical question arises: How can Germany's startup ecosystem overcome these challenges to unlock its full potential as a driver of sustainable economic growth by 2025? This study aims to explore these pressing issues and provide actionable solutions for policymakers and stakeholders.

Methodology

This research employs a descriptive analytical approach, utilizing data collected from official reports, academic studies, and surveys among entrepreneurs. Statistical analyses were conducted to explore challenges and opportunities, categorizing startups based on their sectors and growth stages. Additionally, Germany's startup ecosystem was compared to international models, such as those in the United States, to identify best practices.

1.1. Background and Significance of Startups in Economic Growth

While developing countries are still in the process of establishing a framework and creating the initial growth drivers, the situation in most industrialized countries is dramatically different: here, areas of future growth, like climate change, demographic change, or energy consumption, are increasingly being addressed by startups. In addition, the potential employment and value-creating role of startups has become an important factor in the political and scientific debate of many industrialized countries. Startups, the conditions under which they work, and possible ways for improvement regarding financing are of large interest for companies, politics, and society as a whole. Over the last decades, the U.S. has been the role model for many countries developing their startup ecosystem. This importance and these expectations manifest themselves in various initiatives, where the term "innovation" as one important driver of employment

and growth is mentioned repeatedly, and specifically in national strategies. Especially the latter specifically addresses startups, and for good reasons.
In November 2018, a report was published as the results of a member survey from which it became clear that while the large majority of surveyed industrial companies see the strong link with startups, only a few companies make actual use of their services. This sparse adoption or piloting by industrial companies seems surprising, especially considering the fact that a significant percentage see themselves as being disrupted by the startup ecosystem. Still, a large majority regard possible cooperation with startups as an important part of their innovation strategy so that the field would become an important part of regional policies and strategic foci of companies' departments, such as corporate venturing or innovation management, especially from the point of view of strategic industry partners on the one hand and the primarily early-stage startups with their bottom-up R&D approaches complementing and altering the way established industrial companies develop new products or services on the other. (Kuckertz et al.2020)

1.2. Purpose and Scope of the Study

In our research, we evaluate the current state of the startup ecosystem in Germany, investigate the key challenges faced by entrepreneurs during their search for resources, and model the future landscape of the startup ecosystem in Germany. The main objective of our work is to develop a vision for 2025 that would outline the German startup ecosystem's transformation from the "Silicon Valley copycat" model towards the "Silicon Allee" model and also identify potential opportunities and challenges that may arise in the process. Our study follows a similar but expanded approach where we group various startup ecosystems in Germany by their maturity stage and sources of resilience. We promote a lifecycle analysis of the various startup ecosystems. Moreover, while assessing the current status of the German startup ecosystem, our research also evaluates the latest trends in the tech business world, as well as the specific implementing measures in two good practices. (Joo Sang Woo, 2024)

1.3. Research Questions and Methodology

The goal of this research is to make the growth opportunities and challenges connected to startups in Germany for 2025 visible. This is mainly realized through the analysis of the situation of startups in Germany by identifying the major opportunities and challenges as early indicators. This yields a buy or build insight on how to profit from them and solve them in advance. These are the key foundations for established companies as well as entrepreneurs and their startups in Germany with their action plans. As a result, the findings of this research provide decision-makers in established companies with strong orientation knowledge. Therefore, the initial orientation should be to work with the startups identified. Entrepreneurs are advised to pick one of the startup types when creating, for example, high-tech startups or even serial entrepreneurs and pursue their action plan.

The main aim is to estimate the dynamic economic impact of the underlying growth opportunities and challenges. Through a bottom-up orientation, company contests and workshops within the nonprofit management resulted in an extended deal flow. Deal flow is a term used extensively in the venture capital industry. This comprehensive deal flow is normally exchanged with venture capital investors by investment banks representing startups and venture capitalists. Deal flow can take a number of paths. The

focus is on tax-breakable startups. These are startups where there is a legal obligation to prepare a valuation. This is mostly the consequence of a reactionary behavior of the deployed German fund law. The resulting quantitative study on German and U.S. startups that had taken an exit was complemented by the behavior of the innovative organizations of the nonprofit University of Economics in the field of teaching entrepreneurial sciences. Furthermore, early observable variables such as a wealth effect, location of high-tech startups near the German borders, and the industrial organization of venture capital funds have been observed as early indicators. All applied approaches are fully explored in the following description of the methodology. Starting this process from the societal, academic, and political concentration on a desired mode of economic growth stimulates a higher quality of output. Finally, Germany might succeed in strengthening its post-crisis economic situation, which would have a stimulating, positive effect on all OECD countries. That would also inevitably lead to a new societal, academic, and political concentration. The applied exponential random graph model is able to take in its predictive part an early opportunity to adapt the decision-makers' approach to the growth impact of German startups in 2025. (Fasone & Lupo, 2023)

2. The German Startup Ecosystem

As of November 2019, there were over 6,000 ICT (information and communication technology) startups in Germany. The top three cities with the highest number of ICT startups are Berlin, Munich, and Hamburg. In addition to these ICT startups, there are more than 13,000 non-ICT startups in Germany, with Berlin, Munich, and Cologne being the top three cities on the list. The digital economy in Germany is driven by startups, and these startups receive the most funding for digital innovation even though there is tough global competition from elsewhere.

As startups need a special ecosystem in order to grow, it is interesting to evaluate what this German startup ecosystem looks like and where the current "pain point" is. A healthy startup ecosystem can be split into the hard infrastructure, the soft infrastructure, and into demand and supply for startups. The hard infrastructure fulfills the stable provision of resources. These resources are, first of all, human capital, i.e., the right people with the ability, willingness, and knowledge to start an organization. Human capital in the startup context is, in part, stimulated by education. Secondly, networking with other entrepreneurs and with organizations and institutions is key. Also, the creation of new firms and the termination of old firms is part of this phase. The creation of new firms is important in a regional context, as the location quotient measures the concentration of business firms in a particular industry within the regional economy. High location quotients represent a region with a high local demand for the startup's products or services. The explanation for the terminations of old firms is that if the business environment and access to support are not right, entrepreneurs move and open a new firm in another region. (Garzik2022)

2.1. Overview of the Current Startup Landscape

The Startup report of the German Startups Association’s autumn survey, taken by startups in September and October, supplied the data for the statistics of this article and its follow-up. The remaining reports in this section will provide new or updated data. Throughout this working paper, the survey questions or other explicit sources are only mentioned when directly relevant. According to the Federal Statistical Office of Germany

data on establishments, establishments of startups were registered in based on the responses from the economic sectors. Assuming every third establishment to be a startup, with less than five years of market presence, there would have been startups in, including innovative startups, organized in teams with founders and employees.
In, there were approximately tech startups organized in teams and tech-founded startups. The share of taxes in the tech startup sector is lower than that of the traditional corporate activities of the heads of the department of the Ministry of Finance responsible for central services, public enterprises, policy concerning graduates and staff, and rail transport. The executive branch, i.e., the federal administration, the federal state, and the municipalities, accounts for more. These comparisons benefit from the fact that both the administrative units involved in the survey and corporate activities are published frequently and on different aggregation levels. (Venâncio et al., 2020)

2.2. Government Policies and Support for Startups

Policies in support of entrepreneurship may be aimed at a wide range of activities, from spurring potential entrepreneurs to actually become entrepreneurs to guiding them in selecting their business models or attracting human and financial resources. Policies include regulatory measures aimed at removing unnecessary barriers to entrepreneurship, as well as specific elements aimed at addressing failures in the financial and knowledge markets that particularly afflict startups and young enterprises. In a nutshell, policies in support of startups indeed aim at leveraging entrepreneurship as a key driver of increased levels of competitiveness and growth. Policies are less about picking industry or sector winners and, instead, are focused on creating the right framework conditions within which entrepreneurial initiative can be fostered. Such a framework closely interacts with wider society just as much the other way around. The framework, ideally, is defined along four major elements.
First, there is the quality of an educational system that ultimately determines an economy's preparedness to face the challenges of an increasingly knowledge-intensive world. Without an educational system that not only provides but, above all, instills in its students the conviction to thoroughly and autonomously engage with learning, it is unlikely that entrepreneurs will have the human resources they require and demand. In turn, lack of resources is itself both an element of concern in its own right and perhaps the most active and visible trigger of policy action. Still, that is, first, entrepreneurs, and second, their available human resources who together make an economy the innovative and competitive place that fostered the startups in the first place. The focus of most policy measures is on financial resources and, to a debatable degree, the issue of "successionability" within and among family-owned enterprises. Training people and educating them in a way that lays the foundation for many-sided interaction and communication between them is thus more naturally viewed as representing a key task of society rather than a queue de coeur for successive governments. (Kholiavko et al.2021)

2.3. Key Industry Sectors for Startups

We initially rank the industry sectors in Germany according to their attractiveness for startups in the year 2025. The analysis is based on forecasts of the demand for the respective products and for the productivity of the latest technologies and the capability of German industry to satisfy this demand. Products with a very high and relatively high market forecast, for which the new technologies are very advanced, and for which

forecasts confirm that the German firms are well prepared to enter the markets, are fossil fuel-free energy production, technology for collective intelligence, and geospatial technology. They are also characterized by a high and very high value chain position for firms in Germany. The advantage of technology for atom-free fusion energy generation is that it is an alternative to wind, solar, or water-based technology. Other opportunities rank as relatively high.

All other sectors in Germany usually have problems competing with foreign firms. The most problematic German sectors for which the total value of foreign sales is very low are additive manufacturing and products of agricultural robotics. Their forecast is characterized by a relatively high market forecast but with no very advanced technology. German firms are better positioned for the following industries. A mark of the German firms studying these opportunities is that they are better prepared than the previous sectors, even though industrial information services software are characterized by a relatively high market forecast and very advanced technology. However, it achieved a percentage value of foreign sales of 70%. Only with difficulty does the domestic value chain position reach very high. The industrial fields of mid-price service robots, peripheral MR/VR devices, products of professional drones, sensitive supply chains, devices for intracellular biopsy of blood, muscle, or cerebrospinal fluid, nucleic acid-based drug delivery, and non-renewable recyclates show some growth forecast between 5% and 10% per annum with a relatively high or high sales value. The following high-technology trends are characterized by a growth rate of 6% and the commercial potential as relatively high. (Deng et al.2024)

3. Economic Impact of Startups in Germany

The Economic Impact of Startups in Germany in 2025: Employment, Gross Value Added and Growth.The analysis of the economic effects of startups in the previous chapter emphasized their role in creating new jobs. The idea of startups having more diverse effects, and that they may additionally create significant amounts of gross value added, has not been put in focus. The strategic importance of startups to the economy, beyond their industrial and technological significance, cannot be judged realistically without a holistic understanding of their economic effects. It is exactly this aspect that will be looked at in the present chapter.

Compared to all the other countries included in the survey that ask about the number of people employed in the enterprises surveyed, the share of people who are employed in Germany in startups and in larger companies is considerably lower than the global averages. When startups are defined by the age of the business, a general trend can be seen. After a high level in the category of businesses of 0-3.5 years old, the share of German startups drops to a minimum for firms that are 4-9.5 years old, and then grows with the age of the firm until reaching global average levels at the 10-year mark. An important reason why the share of employees in Germany is so low lies in the distribution of non-SMEs. It is especially the small share of people who are employed in established and smaller companies in Germany that is less widespread internationally. (Skawińska & Zalewski, 2020)

3.1. Job Creation and Employment Opportunities

New businesses traditionally produce more than proportional growth in employment and thus play a significant role in job creation. In fact, young firms in rapidly growing

high-tech industries are among those that offer the most highly skilled and highly paid jobs of the twenty-first century. Where established companies cut jobs, particularly in times of recession, new businesses continue to create jobs. Even when sensitive to economic cycles, new businesses, especially high-tech start-ups, help national employment figures and economic growth. Since established companies are focused on increasing productivity and competitiveness, their headcount becomes less important for regulators. Policymakers can often work with start-ups to help meet employment targets and maintain consumer demand—and to ensure that the jobs created are high-skilled, high-paid ones. If they are not doing as well as some of their technological peers, policymakers should be looking at what is happening inside these companies.
Business angels are a critical source of employment and act as job creators. As founders and owners of existing and innovative economies, business angels provide an essential gateway to finance for small start-up companies across all sectors, particularly for non-ICT initiated technologies. Given the early stage of funding gaps in many countries and cost-effectiveness, the importance of business angel funding has grown over the years. Where public funds cannot be dispersed, business angel money will be vital, and this analysis highlights the capacity of business angels to support and invest in start-ups with knowledge and familiarity with the market. Around 40% of potential new start-ups have read the expert review that venture capitalists from a small business that could have lost the potential shareholders as well. Venture capital is the next source of funding for start-ups with high growth companies after the platform. (Pierrakis & Owen, 2023)

3.2. Innovation and Technological Advancements

This convenience to a large degree reflects the increased availability and networking of specialists from all over the world, a worldwide educational network, and improved logistics, including the transport of research materials and goods to and from the various facilities and institutions where academic and non-academic researchers are at work. Thus, German startups will also in the future have privileged access to innovation resources outside Germany and will contribute little within Germany, which furthers the development of or greater access to worldwide innovation resources. This conclusion is of some relevance for the facilitation of knowledge spillovers from startups and other firms in recent research, even if less relevant in practice than often assumed in economic policy considerations. An indirect way to enable startups to contribute more to Germany's innovation capacity would be to apply innovation policy measures to improve Germany's innovative environment and change attitudes. In principle, the proposed facilitation of knowledge exchange as part of carbon capture and storage and carbon capture, utilization, and storage technology transfer services could also be applied to technological spillovers from startups by institutional investors and private equity investors. To the degree this would happen, it would add to the contribution of startups to the innovation capacity of the country where research is carried out and the firm is headquartered. However, there may be limits to the effectiveness of such knowledge transfer services. First, researchers who are willing to share their knowledge in this way with a foreign startup would have to sign nondisclosure agreements. (Cunningham et al.2021)

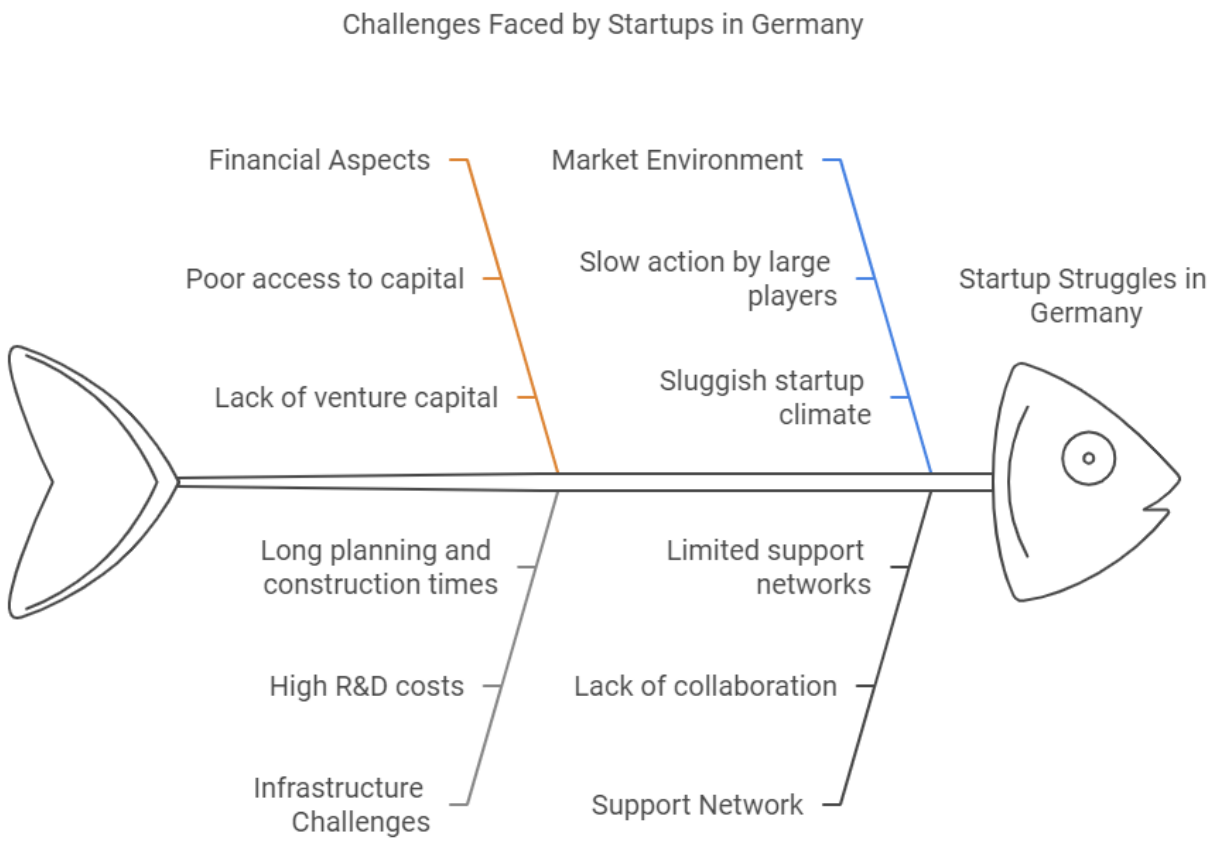
3.3. Contribution to GDP and Export Growth

The examination of the contribution of startups should also particularly focus on the housekeeping of the overall economic achievements, as measured by the growth of real GDP and real GDP per capita. For these growth measures, analogous to the employment measures, there are also different issues focusing on the macro or micro base of growth. In general, it always matters when evaluating the success of a country to investigate the driving forces behind these successes. An acceptable measure for that in relation to startups would be the contribution of startups, i.e., the newly incorporated firms per share of all firms in the respective country accounted for along two celebrated channels that serve as the conceptual workhorses of modern economic growth models: productivity growth and catching up via the technology transfer of superior innovations. In the case of productivity, it can be added that this process is not problem- or discussion-free and that there might be distortions, for example, through overinvestment in ICT, lead users, or big data, and its exploitation.

In relation to the role of productivity, the share of startups is expected to show a direct or positive impact. As successful startups are typically young and represent a share of the labor force, the microeconomic entry of these startups producing new, unknown products with good or outstanding features can lead to an increase in aggregate productivity statistics. This is due to the fact that, under the condition of local computer memory, almost all research finds that startups are more productive on average than more established firms. Accompanied by a parallel development in the opposite direction and the simultaneous fading out of less productive firms, a sizable part of the aggregate benefits in terms of overall society is contributed by startups. In the simplest setup, we thus hold the conjecture that high shares of startups from the past will yield higher product or TFP growth in the future. (Chung et al., 2021)

4. Challenges Faced by Startups in Germany

The six experts identified six challenges that are particularly prevalent for startups in Germany. They consist of financial aspects, infrastructure challenges, a slow action environment maintained by large market players, a sluggish climate for startups in Germany, lack of collaboration, and a limited support network for startups. In the following subsections, each of these challenges is explained in more detail. 4.1 Financial Aspects The poor access to capital for startups in Germany is the first issue pointed out by the experts. It is true there are some forms of capital available in Germany for startups, but according to the analysis, they are insufficient. The absence of venture capital is a widely recognized reason for the lack of high-tech startups in Germany. 4.2 Infrastructure Challenges One of the difficulties faced by startups in Germany is the cost of research and development infrastructure, such as clean rooms. To this obstacle, the long durations for the planning, financing, construction, and operation of the R&D infrastructure to be rented could be added.



4.1. Access to Funding and Venture Capital

In order to successfully drive economic growth, startups need access to funding tailored to their needs. In striving to innovate and disrupt, startups map high-paced development and cash flow patterns that significantly differ from those of established companies. Startups require significant risk financing, also known as venture capital, especially in the early stages. Compared to the American market, access to venture capital in the European Union is rather limited – particularly in the growth phase, founders have great difficulty securing the required venture capital, as global fundraising multiples are not reached. This lack of venture capital is due to a lack of established financial marketplaces, the low affinity of private investors for equities, and the fragmentation of European markets.

The challenge for the German venture capital ecosystem in the future is to expand and optimize the quality of venture capital in such a way that German startups can grow faster and, above all, autonomously. Due to an early-bird investor culture, there are already numerous financing opportunities for seed and startup phases. A significant number of German startups are financed by venture capital in this phase. However, in the growth phases, this first-mover advantage no longer proves to be true – there is a lack of growth, particularly in digital technology companies that enable horizontal, international scaling. Due to a conservative investor culture, access to these means is severely limited, so numerous companies need to rely on international venture capital, especially in the second growth phase. (Maas et al., 2020)

4.2. Regulatory and Legal Hurdles

Germany has a unique and, some might argue, overly strict way of enforcing the laws and regulations intended to protect key societal matters such as privacy. These laws—which are popular—are upheld at high cost, and compliance via RegTech is not user-friendly and no longer points to the most innovative approach. In the field of data protection, Germans are acutely aware of this as they are the beneficiaries of the legal framework often equated with the General Data Protection Regulation, which is seen as very protective and restrictive. The GDPR has also become the de facto global standard for data protection validation, but it clings to its traditional legal regime designed to enforce the letter and breadth of legislation. It is the digitized business model championed by startups that are ill-fitted with such a cumbersome instrument to demonstrate compliance with the data protection standard.

The only alternative at the current time is the well-trodden path of pen-and-paper documentation, time-consuming task-based transactional due diligence, and, after the event, class-action fines for non-compliance. Nonetheless, this lack of useful RegTech legitimization cannot be rolled out for lack of will. It is as much the enforcement framework, typically considered to be an indirect monetization, and the ineffectiveness of the GDPR in stopping business models that infringe the spirit of the letter of existing laws, as well as the data protection standards and the rule of law that has made such a vibrantly bright digital landscape over-regulated. At least a part of this solution calls for a more agile and equally innovative approach to the principles underpinning the laws that are to be upheld, ensuring transposition of these principles into the digital dimension. (Gal & Aviv, 2020)

4.3. Talent Acquisition and Retention

Argued that the key to a world-leading talent pipeline is frequently to bring the world to one's economy, noting that the Global Skills Partnerships are a way for countries to pool education-related resources and build a broader, deeper talent pipeline across different skill levels. However, it is also of utmost importance to invest in talent, develop national skills, and invest in highly educated workers. Interestingly, claimed that building a talent pipeline should follow steps of organizational change by creating an organizational culture that can manage strategic, administrative, and change management capabilities, including a creative, skilled, and experienced work team. Though from the perspective of new business models, it is more feasible to co-innovate with other partners, such as startups, strategic partners, or exited entrepreneurial talents. found that the commitment and dedication of talented employees can give startups a competitive edge. Likewise, determined that knowledge spillover production depends on the potential absorptive capacity of the host country and the mixture of involved individuals. Moreover, in the context of the positive externalities of startups, suggested that it is crucially important for regional developers to understand the multiple functions that young talents have in a locality. also showed that promoting startup behavior among younger members of the workforce could help to buffer economic problems stemming from the lack of entrepreneurial incentives for pension-aged workers in Europe. Consequently, the successful creation of ten young companies and the generation of quality jobs is an important tool to build the capacity and sophistication of the democratic institutions of a country. (Bass et al., 2024)

5. Future Trends and Opportunities for Startups

Interest in data-driven business models will intensify, and startups will have particular opportunities in building them, as the falling price of data capture, storage, transfer, and processing will facilitate a rapidly increasing number of digital services, while advances in artificial intelligence and machine learning techniques will continue to add to the value potential. The rise of platform-based business models, however, will make it more challenging for small companies to sustain their initial innovation and success in a fragmented manner and to compete with specialized large players' scale and scope advantages. Startups will have to increasingly understand that being acquired by larger players will be their most attractive exit option. Although there are certain limits to the various data protection, IT security, and other policies that can be formulated—like not unduly sacrificing convenience or utility—governments need to establish frameworks for data utilization that are fit for purpose. In terms of science and technology priorities, artificial intelligence needs a more ambitious agenda for research and innovation. Besides reinforcing national AI capabilities, Europe needs new centers of excellence and ecosystems linking universities and research and development institutions with startups, large companies, cities, and public administrations. In general, research and development spending should increase further, and policymakers should work to improve private companies' incentives to expand their own innovation-related activities. Europe and Germany have distinct advantages in leading the data economy. Besides significant data market potential, especially in industrial and business services, the continent has a relatively strong regulatory tradition around data privacy and data security that is increasingly globally relevant. The cloud industry is continuously developing and is being propped up by Germany's industrial base. European cities have strong communities of AI researchers and practitioners. Joining forces in a global data alliance that seeks to set common data protection and privacy standards could turn the European AI strategy from a defensive posture to a leading role. Germany should prepare the right legal and ethical principles for citizens, stakeholders, and businesses so that data processing can continue to focus on high-quality, accelerating user benefits without overregulating the potential uses of artificial intelligence. Digital innovation and transformation involve new business models and major disruptions due to automation. As a result, winners and losers may emerge while new inequalities are created. Societies require digital infrastructures that foster inclusive and open public service provision in established and new industries. The resolution of these issues will again require a wider-ranging multi-stakeholder dialogue and leadership by the private sector. (Yeung & Bygrave, 2022)

5.1. Emerging Technologies and Industries

With the intensification of global digitization, technology has become the backbone of both the creation of successful business models and economic growth. Technologies like artificial intelligence, cybersecurity, blockchain, cryptocurrencies, distributed ledger technology, cloud and virtual reality, algorithms, and machine learning assist in optimizing resource allocation and increasing efficiencies. Since it has crucial relevance for startups, it will be explained here in detail. The development of technologies is a long, complex, and risky process due to research and development, trial and error, and capital costs. These factors limit the technology uptake of incumbent firms because the higher

the technology investment, the smaller the potential for product failure and capital overcommitment.

But technology is characterized by network effects, derived from the direct and indirect increases in the value of goods and services. Initially, many developers are required to create products suitable for final customers. After certain technologies have become widely available, the products created show economies of scale and scope because the intensification of the labor factor helps to decrease marginal costs and economies of agglomeration due to the presence of a growing range of specialized workers. These economies stimulate firms to develop alliances, clusters, hubs, and value chains, which raise the level of competition and consolidate the development, implementation, distribution, and efficient use of related products. Such network effects justify high technology competition, the growth of incumbents engaged in production, and the resurgence of the concentration phenomenon. The German economic trajectory, especially that represented by the Mittelstand, illustrates the influence of network effects with accuracy. (Utouh & Kitole, 2024)

5.2. International Expansion and Market Access

In the same way that the development of the domestic market aided the development of the German Mittelstand, the expansion of the Mittelstand abroad further increased its influence. In this sense, Germany's economy is not strong only because of its strong domestic market but also because of its strong global players. Unlike traditional businesses, the digital global leaders have a business model that is easier to scale when expanding because they have a lower physical capacity that can slow down the process. An example of this is Xiaomi, which scaled to become the fourth largest mobile manufacturing company in the world in just six years. After this successful road, the same company raised $1.1 billion with a valuation of $45 billion from the venture capital industry to carry out the international expansion. In contrast to traditional production companies, companies such as Google or Microsoft have a headcount made up of 70% local workers; in fact, they have become an example of how companies should have a presence in other countries. This is the way that the digital multinational companies will be established in the new digital era.

The biggest challenge to face is the regulatory framework required by some of the sectors: catering, healthcare, insurance, telecommunications, cybersecurity, etc. and the regulatory complexity requiring physical presence, such as personalized medicine. An analysis stated, "A single market for a digital society strategy will be Europe's main transformational impetus and enable global companies to grow and develop in Europe," but we believe it is not only a European challenge; other international markets have to create regulatory frameworks to give international access to digital companies. Providing international access to global leaders is essential for financial investment because, in addition to seeking a high profitability of their investment, venture capital firms, due to the scale of the business presented by a digital company, seek that the company they are sponsoring has the capacity to grow until it is able to enter the stock exchange, where their profits will be considerably higher than if they sell their position to another company. To do this, the company has to grow significantly in the valuation of the business, so quite frequently there will be few companies globally that will have the purchasing capacity to absorb the scale that these companies have. (O'Neill et al.2020)

5.3. Sustainable and Socially Responsible Business Models

The further creation of companies in a more sustainable way, in a socially and economically positive manner, is also addressed by other trends. Business models in global use will be further developed, tested, and scaled. Behind this is the idea of creating value not only by generating profits but also by assuming social responsibility in order to contribute to solving social, ecological, or economic problems. Companies that do this can present themselves as attractive employers and retain good employees, especially from the millennial generation, for longer. This applies to companies regardless of their size and volume. However, especially startups and corporate startups in Germany can make it a part of their strategy to assume a role as "purpose athlete." They can draw on the experiences that have long been gained around the social market conditions for these business models.

Concrete and aggregated success stories or best practices could be very helpful if both companies and society want to drive change at the national level towards ecological, economic, and social progress in the necessary areas. By following their role model capabilities, the framework of a business model world, as a framework for action, support opportunities should be taken up so that this can continue to grow sustainably. In concrete terms, there are numerous forms in which companies can bear societal and ecological responsibility. The primary goal of many startups is to realize the business idea and to achieve financial success. Influencing value creation and, with it, creating social and ecological added value can become a matter of course and represent a core part of business activities. Companies act in the sense of Shared Value Creation: when a company takes the values, needs, and requirements of its stakeholders seriously and pushes the implementation in its business model and activities. (Leatherbee & Katila, 2020)

6. Conclusion and Policy Recommendations

The six chapters of the study have shown some success stories, but also pointed to some structural weaknesses and policy challenges for startups in Germany in 2025. The study has highlighted that many startups offer significant innovation potential for the German and indeed EU economy, especially in terms of digitization, life sciences, environmental technologies, services, business models, and particularly in niche markets.

The potential that Germany's innovative, dynamic, and often internationally successful startups offer has been amplified by the crisis. Policymakers at the federal and state level have taken a number of new measures and enhanced support programs to sustain the startup scene until the vaccine has been tested, produced, and delivered. These measures include the introduction of a startup package with matching funds to support startups in the most challenging times, the expedited funding of startup developers through the fast-lane instrument within the scope of the Central Innovation Programme for SMEs, and support for startup accelerators for continued investments in their startups.

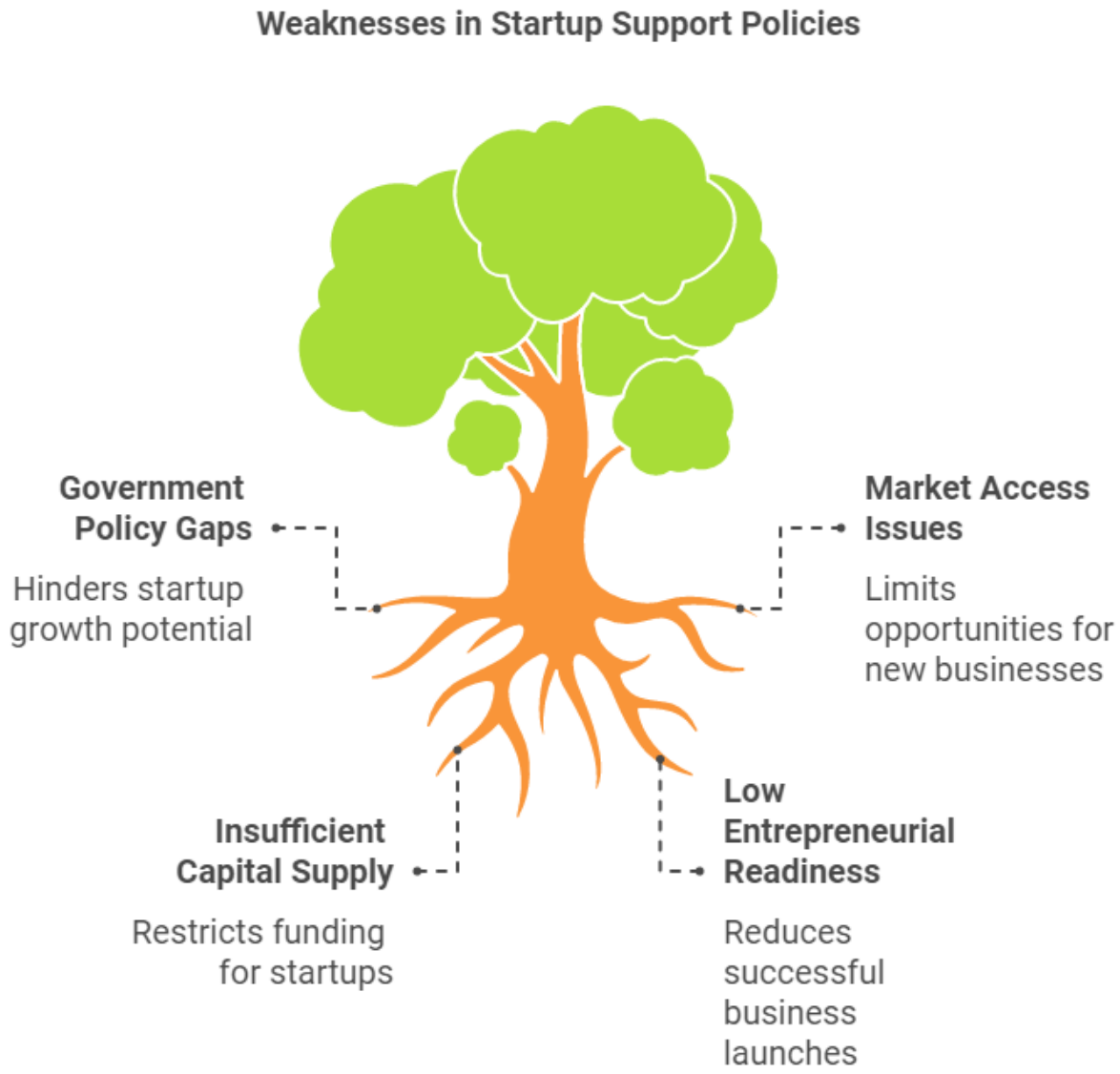
Despite these many success stories, German startups face numerous structural weaknesses in the innovation and growth sectors. Although Germany is a global export champion, the share of German startups with high or very high levels of internationalization is relatively low compared to other EU Member States. The relatively low level of revenue is especially challenging. A large part of the German startup scene is also weakly linked or not connected to scientific research. This specific challenge is an important concern as many German universities have developed into so-called startup

campuses of late. These campuses are embedded in a broad ecosystem that ranges from startup consultants to incubators/accelerators, investment, and technology transfer organizations; public and private mix, but in need of significant further development in the tipping phase. Furthermore, inadequate demand, financing constraints, and competitive disadvantages vis-à-vis foreign corporations are a variety of structural weaknesses that hinder startups on their way from the lab to the market.

Making good use of the opportunities that many remarkable German startups offer will by no means be automatic. The scaling phase from innovative research idea to industrial prototype creation of a niche market and niche product, either by the startup alone or together with a small and medium-sized enterprise or a private venture in the public sector, is known to be difficult. The market, money, management—and clarity, credibility, change, decisions, connections, control, compass, capacity—from venture capital, as well as technological research and development in the scope of the small nanoelectronics market, have repeatedly been found to be important, challenging, and problematic yet unknown conditions. During our study, there was even some concern that mounting demand and investment funding for startups do not predominantly revolve around the creation of technology bubbles around a very small number of fail-proof solutions. It is in the endeavor to understand and address these concerns and challenges; in the understanding that there is a need for frequent revisits and in the conviction that innovative technology-based startups are not just problem-solving entities, but also indispensable contributors providing solutions to the grand societal challenges that we have written the six chapters of this study and drawn seven policy recommendations. (Wang et al.2024)

6.1. Summary of Findings

The objective of this report is to outline how startups can continue to contribute to the prosperity of Germany, secure economic growth, and face current and future challenges. We predict that, through their innovative business models and their capacity to successfully disrupt incumbent market structures, startups will remain a core driver of prosperity in Germany in the next decade by taking advantage of emerging technological, structural, and demographic mega trends. This report has presented an analysis of how well current government policy and economic conditions in Germany will encourage and support a focus on startups as a future driver of economic success. This included looking specifically at the role of startup policy, market access, and the supply of capital alongside the level of entrepreneurial readiness of those seeking to start a business, as these are all empirically shown to foster an environment where business startups are successful. What we have encountered is both positive signs of competitiveness and growth in some sectors, but also observable weaknesses in a number of key areas where current government policies will need some refocusing in order to make the best of the opportunities that exist and which are occurring in other locations. (Skawińska & Zalewski, 2020)



6.2. Implications for Policymakers and Stakeholders

Hence, there are broad effects of smartphone applications across a large number of sectors, and they also stimulate capital investment and a positive outlook for the development of future applications. Europe's government and policymakers need to make 5G investment a "matter of urgency" and should invest in the sort of infrastructure that allows Europe to perform in the digital economy. This can also help resolve regional disparities in access to fast networks. The desire for such networks is there, with 80 percent of communication in Europe occurring through mobile devices by 2025.

Correct allocation of frequencies and a clear regulatory framework for standardizations that favor the European industry are required to ensure Europe's competitiveness and solve this problem. Policymakers have to balance every citizen's rights with interference when regulating the digital environment. Improvement in broadband infrastructure, which would be a massive economic opportunity for some countries in particular, will further drive economic growth as small and medium-sized businesses also develop e-commerce. (Briglauer et al.2021)

6.3. Recommendations for Fostering Startup Growth

Throughout this report, we have identified numerous existing barriers to the growth of startups and proposed solutions. We want to reiterate the primary opportunities and threats for startups to grow by presenting a set of 11 recommendations. They are largely drawn from the key opportunities, threats, and ongoing trends within the technology ecosystem.

- Strengthening the Venture Capital Ecosystem.
- Creating attractive investment conditions for venture capital funds and fostering the participation of private and public capital.
- Supporting the standardization of deal documentation to shorten investment cycles and reduce the cost of investments.
- Attracting international venture capital networks to Germany with the help of players that have an international focus.
- Providing targeted support programs for seed and early-stage funds.
- Reducing the Administrative Burden for Startups.
- Incentives for Corporates to Collaborate More with Startups.
- Introducing tax breaks or innovation-related cooperative funding for corporates that will work with startups or other players in the technology ecosystem.
- Creating incentives within the bidding and public procurement processes for big companies to choose suppliers and partners that are more innovation-driven, especially startups.
- Involving existing innovation hubs – either within the government or working closely with it – in corporate partnerships to systematically identify technology portfolio gaps that might be solved using solutions developed by startups or mature technology companies. (Audretsch et al.2023)

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