




# Entrepreneurial universities and the third mission paradigm shift from economic performance to impact entrepreneurship: Germany's EXIST program and ESG orientation

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## Abstract

The proliferation and intensity of modern grand challenges, and the current broad public awareness of them, has resulted in a demand for entrepreneurship with an eye toward environmental, social and governance (ESG) matters, not just profits and economic gain. When it comes to economic applications, this realigned focus on impact-oriented entrepreneurship has significantly altered the way in which entrepreneurial universities address their third mission of service to society. The overall paradigm shift toward an ESG orientation drives these entrepreneurial universities to structure their efforts in technology transfer and creating academic spinoffs to produce startups which heavily employ impact entrepreneurship and ESG principles. This paper finds that governments can assist with this transition by creating funding programs, or updating existing funding programs, which favor the selection of impact entrepreneurship focused spinoffs that make use of ideas and knowledge from the university sphere. The EXIST program from the German government serves as a prime example of just such a financial mechanism that has evolved across multiple decades to more heavily incentivize academic spinoffs that place ESG at the core of what they do, in addition to the original goals of producing economic and technological development and increasing local, regional and national competitiveness. These findings bear implications for government and university leaders in regard to technology transfer policy and academic spinoffs at entrepreneurial universities.

**Keywords** Entrepreneurship · Academic entrepreneurship · Higher education · Technology transfer · Entrepreneurial university

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## 1 Introduction

The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. Therefore, all progress depends on the unreasonable man.

George Bernard Shaw

Studies on academic entrepreneurship in the last decades have centered on the question of how places, either regions or states, could cope with the challenges and chances of a globalized world, and how this brought about increased competition, not only for customers, but also for critical resources like ideas, human capital, knowledge and financial capital (Audretsch et al., 2023). Impressed by the dominance in the academic rankings by Anglo-Saxon universities and the increasing prevalence of academic spinoffs and new ventures created by these universities enabled by the Bayh-Dole Act of 1980 (Mowery et al., 2001), the European Union proclaimed a ‘new deal’ in the higher education system aimed at fostering academic spinoffs (Audretsch et al., 2015). In its famous meeting in Lisbon in 2000, the Council of Europe identified entrepreneurship, along with investments in science, technology, and education, as the keys to reigniting European growth (Audretsch & Link, 2012). As the President of the European Commission at that time, the Italian economist Romano Prodi, exclaimed, “*Our lacunae in the field of entrepreneurship needs to be taken seriously because there is mounting evidence that the key to economic growth and productivity improvements lies in the entrepreneurial capacity of an economy.*” (Prodi, 2002).

However, after a quarter of a century, not only the success of academic spinoffs in (continental) Europe is rather modest, with only a few examples of widespread success, such as BioNTech, an academic spinoff from the University of Mainz. In addition, times are rapidly changing, culminating with the slogan of the ‘grand challenges’ and a call for a new way to deal with these challenges, all with an added focus on universities as the intellectual and moral center of the effort (Menter, 2023). More and more, these challenges are being categorized within the three broad categories of environmental, social and governance, collectively referred to as ESG (Li et al., 2021). This requests a new role for entrepreneurial universities and academic spinoffs (Cunningham et al., 2019, 2022). Not only should entrepreneurial universities foster spinoffs helping to improve local or global competitiveness by commercializing new ideas and knowledge, but the grand challenges today also request solutions beyond economic goals. Environmental examples include climate change, global warming and the consequences like droughts, sea level rising, air- and sea-pollution and natural disasters. Social issues include migration, the restrictions of privacy, diversification of societies, pandemics and wars. These increasingly global problems can not only be solved by governments. On the contrary, the solution to, or mitigating the consequences of, the grand challenges is also seen decentrally and includes entrepreneurial firms and academic spinoffs (Menter, 2023).

This defines a new role for an entrepreneurial university. Producing knowledge spillovers to be commercialized by spinoffs becomes only one part in the ‘third mission’, also referred to as ‘service to society’ (Otto et al., 2021). In addition to this, producing knowledge that isn’t necessarily intended for the market, like ethical and moral behavior, such as thinking in terms of protecting the earth, respecting the lives of future generations and the diversity of humans, fighting against the increasing trend of autocracies even in democracies, has replaced the prior model of an entrepreneurial university, which has primarily focused on evaluating and exploiting economic opportunities. A paradigm shift

has occurred in the last years, from performance to impact (Menter, 2023). From performance, like counting the quantity of academic spinoffs, their market volume, their speed of globalization as gazelles, and their profits, towards a less profit-oriented mission, that is, their broader impact. Impact entrepreneurs are purposefully driving progress toward the grand challenges, which are summarized and condensed by the UN's Sustainable Development Goals (SDGs) (Volkman et al., 2021). Universities have long been the central and focal place for intellectual debates dealing with grand challenges and developing new ways of thinking, acting, and deciding (Lehmann et al., 2021). Consequently, there is a new mandate for the university as the intellectual place to harness these challenges by creating opportunities for academic spinoffs as impact entrepreneurs (O'Kane et al., 2021). Academic impact entrepreneurship then refers to efforts within universities to motivate and coordinate scientists, academics and staff, to create, develop and sustain new business models that pursue social, environmental or governmental goals as an integral part of the business model beyond pure economic or financial performance (Menter, 2023). Thus, an entrepreneurial impact university should be not only be driven by opportunities to create and transfer commercializable knowledge to fuel economic development, but also to create an intellectual atmosphere for nascent academic entrepreneurs to create impact spinoffs to foster growth and competitiveness and achieve broader societal goals (Klofsten et al., 2019).

While much research has been devoted to the importance of entrepreneurial universities in general as sources of generating knowledge and the commercialization of knowledge spillovers by academic spinoffs (Cunningham et al., 2022; Lehmann et al., 2021), little or nothing is known about the transformation towards academic impact entrepreneurship. While the focus of the traditional entrepreneurial university was to increase local competitiveness and growth, the focus of the entrepreneurial impact university lies on the global level (Audretsch et al., 2022). While traditional entrepreneurial universities are competing for scarce resources like scientists, students or financial resources to pursue their mission to improve local competitiveness and growth, entrepreneurial impact universities are forced to cooperate to fulfill the global goals, namely, to deal with the global grand challenges. This paper studies the transformation of entrepreneurial universities towards more social impact in Germany by analyzing how academic impact entrepreneurship has been fostered by the government. As a consequence of the pivot announced by Prodi for the European Union (Prodi, 2002), the federal Ministry of Research and Education in Germany launched the EXIST program, a program dedicated to spur and foster academic spinoffs. While at the beginning of the program the focus of the funding lies almost exclusively in high-tech and fast-growing industries (Mueller, 2023a, 2023b, 2023c), this tendency has been changed in recent years to supporting and funding in particular academic impact entrepreneurship, reflecting this broader transformation process.

While there exists a rich and large literature on knowledge and technology transfer in general (Audretsch et al., 2014; Cunningham et al., 2019), little is known in the context of academic impact entrepreneurship. Even though universities, particularly in continental Europe, have a mandate to create impact academic entrepreneurship in a local and global perspective, it remains rather unclear how they could be incentivized to leave their old path of performance focus and foster impact entrepreneurs to pursue a global and social perspective beyond economic gains. In essence, the challenge for entrepreneurial impact universities is to deal with the driver of change: namely impact entrepreneurship (Miller et al., 2021). While universities in Germany, and continental Europe, are mainly fueled by public funding, their resources to foster impact entrepreneurship are rather limited. This study makes a contribution by analyzing the role of governmental programs in filling this

gap and attempting to foster academic impact entrepreneurship in Germany by exploring the EXIST program through case study analysis.

The remainder of our paper is structured as follows. Section 2 provides a brief review of the literature on the development of impact entrepreneurial universities—what we know, what we don't know and what we should know. Section 3 introduces the EXIST program and highlights the transformation process described above. Section 4 concludes and provides avenues for potential future research.

## 2 Literature overview

This overview of the relevant literature introduces the concept of entrepreneurial universities, explains how this orientation impacts all three university missions, discusses the role of technology transfer and academic spinoffs in the economic applications of the third mission and introduces the ESG (environmental, social, governance) pivot of organizations and universities and summarizes how this leads to a preference of academic spinoffs which employ principles of impact entrepreneurship.

### 2.1 Entrepreneurial universities & the third mission

As mentioned in the introduction, the needs and pressures of modern society call for universities to take on a more entrepreneurial orientation in their approaches and goals (Audretsch et al., 2022; Guerrero et al., 2014; Hahn et al., 2020; Lehmann et al., 2022b; Paleari et al., 2015). This results in a modern university business model known as the entrepreneurial university (Audretsch, 2014; Guerrero & Urbano, 2012; Otto et al., 2021). Scholars have identified that the entrepreneurial university plays a vital role in an entrepreneurial society by fostering an environment conducive to turning ideas into opportunities for social and economic purposes (Audretsch et al., 2012; Guerrero et al., 2014), by serving as the connective tissue for entrepreneurial networks and partnerships alongside the external community (Guerrero & Urbano, 2012), by improving relative efficiencies (Otto et al., 2021) and creating and distributing knowledge that improves economic competitiveness in multiple locational contexts (Audretsch et al., 2019; Cunningham et al., 2019). Owing to these operational advantages and improvements that universities achieve through an entrepreneurial organizational alignment (Audretsch & Belitski, 2021; Guerrero & Urbano, 2012), the entrepreneurial university model has proven to have substantial economic impacts for the societies in which they exist (Guerrero et al., 2015), particularly as entrepreneurship has emerged as a key component and determinant of economic prosperity (Audretsch et al., 2023).

To be a comprehensively entrepreneurial institution, universities must adopt an entrepreneurial approach to their three acknowledged missions: teaching, research and service to society (Guerrero & Urbano, 2012; Otto, 2021). This implies not only entrepreneurial content, but also entrepreneurial methods. Thus, for an entrepreneurial university, teaching entrepreneurship formally through study programs is crucial (Hahn et al., 2020), but taking an entrepreneurial and innovative approach to academic content delivery is important as well in achieving positive outcomes for stakeholders (Lehmann et al., 2022b). Researching entrepreneurship necessary (Lehmann et al., 2022a), but must also be complemented by innovative behaviors and attitudes in all research conducted at the university (Audretsch et al., 2010). While there are many different interpretations of service to society, also

known as the ‘third mission’ (Otto, 2021; Paleari et al., 2015), scholars concerned with the topic of entrepreneurial universities have largely taken an economic perspective of the third mission, seeking to fully understand the ways in which an entrepreneurial university provides economic benefits to the society which it serves (Guerrero et al., 2015). Thus, each activity area of an entrepreneurial university is interconnected strategically and functionally to achieve its aims (Audretsch & Belitski, 2022).

## 2.2 Technology transfer & academic spinoffs

Acknowledging the focus on economic outputs of the third mission in the entrepreneurial university context, scholars have traditionally centered their research on university contributions to society via technology transfer and academic spinoffs (Audretsch et al., 2019; Civera et al., 2019; Meoli et al., 2019; Siegel et al., 2003b). Technology transfer can be considered the process of taking university research, ideas and knowledge and transmitting them into commercial opportunities within the private sector, therefore improving local and national economic performance and global competitiveness (Lehmann et al., 2022a; Siegel et al., 2003a, 2003b). Because of the importance that governmental and societal stakeholders place on the ability of universities, especially public institutions, to transfer their knowledge into broader economic improvements (Audretsch et al., 2012; Paleari et al., 2015; Siegel et al., 2003a), technology transfer is intentionally pursued by multiple forms of universities (Hülsbeck et al., 2013; Starnecker & Wirsching, 2022), through technology transfer offices (TTOs) located directly on university campuses (Siegel et al., 2003b) and through both formal and informal means and approaches (Civera et al., 2020; Link et al., 2007).

One specific way, among others (Belitski et al., 2019), in which university technology transfer manifests is through the creation of academic spinoffs, a topic which has attracted growing attentions from policymakers and scholars alike (Civera et al., 2020; Meoli & Vismara, 2016). Academic spinoffs are firms that are created directly as a result of ideas and knowledge generated within the university environment (Meoli et al., 2019). These commercial opportunities are encouraged through TTOs (Siegel et al., 2003a), are often spawned with direct involvement of both academic and non-academic actors (Bonardo et al., 2011; Civera et al., 2022; Criaco et al., 2014) as a signal of public and private partnership and resource contribution (Colombo et al., 2019) and are typically associated with technological advancement (Audretsch et al., 2019; Meoli & Vismara, 2016). Because academic spinoffs have traditionally been encouraged and supported due to a desire to utilize universities to enhance the economic performance and competitiveness of their respective societal stakeholders, these firms have been assessed in a way which emphasizes their contributions to economic growth, job creation and patent production, among other metrics (Audretsch et al., 2012; Bonardo et al., 2011; Civera et al., 2022; Colombo et al., 2019; Cunningham et al., 2019; Guerrero et al., 2015; Otto et al., 2021).

## 2.3 ESG orientation & impact entrepreneurship

However, as alluded to previously, there are more ways to interpret a university’s service to society than just a strictly economic lens which focuses on primarily financial outcomes (Otto, 2021; Otto et al., 2021). Entrepreneurial universities exist within societies that are experiencing challenges that cannot only be addressed through improved economic performance, and these universities are increasingly being expected to play

a significant role in addressing and solving these problems within the realm of ESG (Audretsch et al., 2022, 2023). Addressing ESG concerns through an updated orientation of organizational missions, strategies, operations and practices is associated with a broader notion of sustainable development (Li et al., 2021; Lokuwaduge & Heenetigala, 2017). While a shift to organizational ESG orientation has largely been focused on private firms and investment strategies (Sciarelli et al., 2021), universities have begun to adopt this orientation as well (Bice & Coates, 2016; Chen & Vanclay, 2021; Gary, 2016). An entrepreneurial university's third mission performance is thusly judged not only on its economic impact, but rather its economic impact while adhering to ESG principles.

This shift to an ESG orientation for entrepreneurial universities is then incorporated into the academic spinoffs which it seeks to generate (Guerrero et al., 2016). An example of this a push for academic spinoffs to implement principles of impact entrepreneurship, that is, encouraging the creation of firms which have goals that are motivated by ESG and sustainable development as well as profit (Markman et al., 2019; Rok & Kulik, 2021). While multiple countries have devised technology transfer and academic spinoff strategies to stimulate more entrepreneurial and commercial activity as a consequence and product of university research, Germany's EXIST program serves as a prime example of an initiative which has evolved over time to place more emphasis on producing academic spinoffs which exhibit ESG characteristics (Mueller, 2023a, 2023b, 2023c). The next section of this paper then further describes the nature of the EXIST program and provides descriptive empirical evidence of the shift to a focus on impact entrepreneurship.

### 3 The EXIST program

Similarly to Prodi's opinion at the EU level, former German Chancellor Schroeder recognized that a paucity of entrepreneurship was holding Germany back. Schroeder's declaration of 2004 as "The Year of Innovation" may be as revealing as it was symbolic. For a country bogged down with stagnant economic growth and nagging increases in unemployment, entrepreneurship held the key for reigniting Germany (Audretsch et al., 2015). Both broad, sweeping policy changes and institutional reforms were initiated by Chancellor Schroeder to ignite German entrepreneurship. These included new programs providing funding and informational services facilitating academic startups, like the EXIST program. The EXIST program, which was initiated by the Federal Ministry for Economic Affairs and Climate Action, has a focus on spawning spinoffs and startups from universities. It has an explicit mandate to promote university-based startups and foster a culture of entrepreneurship (Mueller, 2023a, 2023b, 2023c). What is particularly instructive about the EXIST program is that it includes regional partnerships involving local governments, non-profit organizations and universities. Thus, an important and striking contrast with the now world-famous Small Business Innovation Research (SBIR) program in the United States is that while the American program involves solely the small business itself, the German EXIST program brings together and unites all key entities and actors from different parts of society within the relevant region, including the university, government, non-profit organizations and entrepreneurs.

### 3.1 The EXIST program components & logistics

Initiated with the promotion of five model regions in 1998 to achieve the goal of supporting university graduates, scientists and students in preparing their technology-oriented and knowledge-based startups, the EXIST program relies on three pillars (Mueller, 2023a, 2023b, 2023c). First, EXIST-Potentials supports universities and their startup networks in implementing structures and creating conditions to foster the region's entrepreneurial activities in a sustainable manner. In addition, efforts to establish a university as an entrepreneurial university through international competition are promoted (Federal Ministry for Economic Affairs & Climate Action, 2023a). Second, the EXIST Business Startup Grant supports students, graduates and researchers in teams of up to three founders for up to twelve months with personal grants between 1,000 and 3,000 euros for personnel cost of living, additional non-personnel expenses up to 30,000 euros and a coaching budget of 5,000 euros. To ensure that only the most well-supported ideas are funded, a university or public research institute must be involved and submit the application. The funding is dedicated to innovative technology-based startup projects and innovative knowledge-based services, which are derived from scientific findings (Federal Ministry for Economic Affairs & Climate Action, 2023b). The third pillar is the so-called EXIST Transfer of Research, which has two phases of funding. In the first phase, research teams at universities and public research institutes (a maximum of three academics and technical assistants plus one person with managerial competence) are supported "to carry out resource development, to verify technical feasibility, to develop prototypes, work out a business plan and finally to start up a business" (Federal Ministry for Economic Affairs & Climate Action, 2023c). Also, in this first phase of the program, personnel expenses and additional costs on materials and equipment, including student assistants, up to an amount of 250,000 euros are eligible for maximum 18 months. The second phase addresses small, technology-oriented companies that were founded during the first phase of funding. At least one person of the original founder team must be part of the management team of the new venture. Further resource development for starting business operations and laying the foundation for external business financing are supported by a grant of up to 180,000 euros which does not require repayment. Since 2014, The EXIST program is co-financed by the European Social Fund (ESF) (The Federal Government, 2023a). The ESF is a redistributive financial instrument which improves social cohesion and economic welfare, which should be achieved by fostering technology transfer and commercialization of research.

### 3.2 Transitioning from performance orientation to ESG orientation

Based on the political goal to strengthen the entrepreneurship landscape in Germany by promoting entrepreneurial universities and academic spinoffs, the first and the third pillar of the EXIST program and their development over the last 15 years should be analyzed. Since 2007, 489 Transfer of Research grant applications with an average amount of 880,000 Euro have been promoted. Since 2015, the program has grown in numbers, and the supported research fields have shifted. The year 2015 marked a turning point as the year when the 2030 Agenda for Sustainable Development was adopted by Germany and the other 192 members of the United Nations (see Fig. 1). The implementation of the agenda started promptly and influenced many programs initiated and financed by governmental institutions (The Federal Government, 2023b).



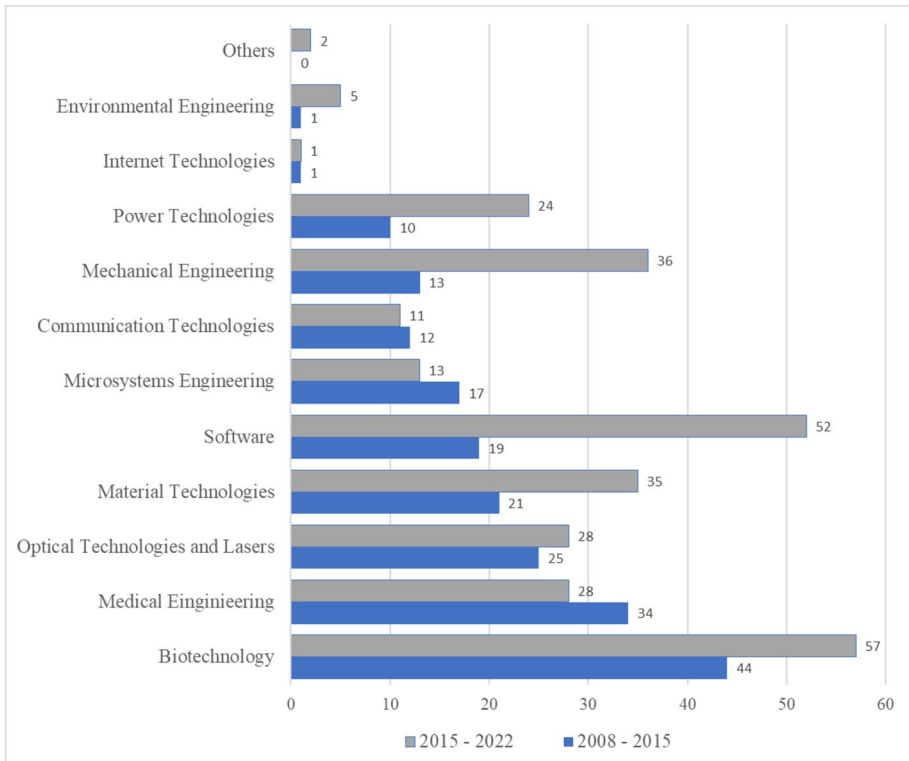


Fig. 1 The Global Goals for Sustainable Development (Project Everyone, 2023)

In 2021, the German government under former chancellor Angela Merkel updated the German Sustainable Development Strategy, which is based on the 2030 Agenda for Sustainable Development (The Federal Government, 2021). The current German government under chancellor Olaf Scholz has strictly focused their governmental program on sustainable development goals as well. Focusing on the twelve technology fields that the research transfer projects from the EXIST program are classified in; it is obvious that a shift to an ESG orientation has occurred. Environmental Engineering, Power Technologies and Material Technologies are only three fields which gained in significance since 2015 (see Fig. 2). A very good example for a successful project is Orbem, founded in 2019 as an academic spinoff from the Technical University of Munich. The company combines accelerated magnetic resonance imaging with advanced artificial intelligence to scan, classify and sort organic products like eggs, nuts and seeds. The procedure can check the fertilization status of eggs prior to incubation and thus enables the sale of unfertilized eggs for human consumption (Orbem, 2023). By doing so, they have a strong impact on the food industry by helping to avoid wasting resources, thereby contributing to at least three of the global goals: zero hunger, responsible consumption and production and industry, innovation and infrastructure (United Nations, 2023).

Beginning in 2023, the EXIST program has also been addressing another goal for sustainable development, namely, gender equality. From 2007 to 2015, the proportion of female founders in the teams that received funding was 13%, in 2015 it grew to 22% and 2022 it developed further to 24.1% (Federal Ministry for Economic Affairs & Climate Action, 2023d; Federal Ministry for Economic Affairs & Energy, 2015). The current funding stipulations explicitly states that the proportion of women, as well as overall diversity, in founding teams should be increased, which reflects the importance of ESG principles. Furthermore, in line with the startup strategy of the federal government, in July 2023 a new initiative called “EXIST-Women” was launched. 6.5 million euros have been made available for the program which seeks to promote and support women-led startups, regardless of the technology or subject matter of the university spinoff (Federal Ministry for Economic Affairs & Climate Action, 2023e). This program tackles not only the third, but also the first pillar of the EXIST program, substantially impacting university programs which foster



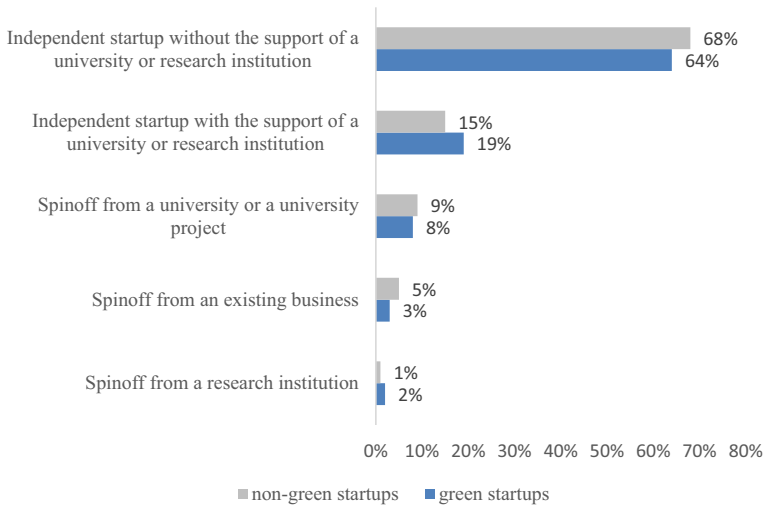


**Fig. 2** EXIST Research Transfer Phase I (Federal Ministry for Economic Affairs & Climate Action, 2023d; Federal Ministry for Economic Affairs & Energy, 2015)

academic entrepreneurship. This strategy strives to share best practice events, instructional formats and educational formats to enrich opportunities all over the German university landscape.

Besides social aspects, environmental goals became more and more important for the EXIST program over time. Green tech startups are an integral part of the German startup ecosystem and account for about one third of all startups (Fichter & Olteanu, 2022). It is particularly positive to note that green startups are not only more innovative in the areas of their products and services, business models, technologies and processes, but even have a higher proportion of female founders (Fichter et al., 2023). To understand the importance of the current EXIST program for Germany to be successful in achieving the Sustainable Development Goals and considering ESG principles, it is beneficial to analyze where these green startups arise. 29% of all green innovative startups in Germany are research-related (see Fig. 3). Within this group, independent startups with the support of a university or research institution play the largest role with 19%.

Among the non-green startups, the share of university spinoffs is slightly lower at 25%. It becomes clear that the university and research ecosystem is of high importance for the implementation of innovations through startups, and even more so for environmentally friendly innovations (Fichter & Olteanu, 2022; Guerrero et al., 2016). The founders themselves state that it is important to more than 75% of startups to have a positive social or



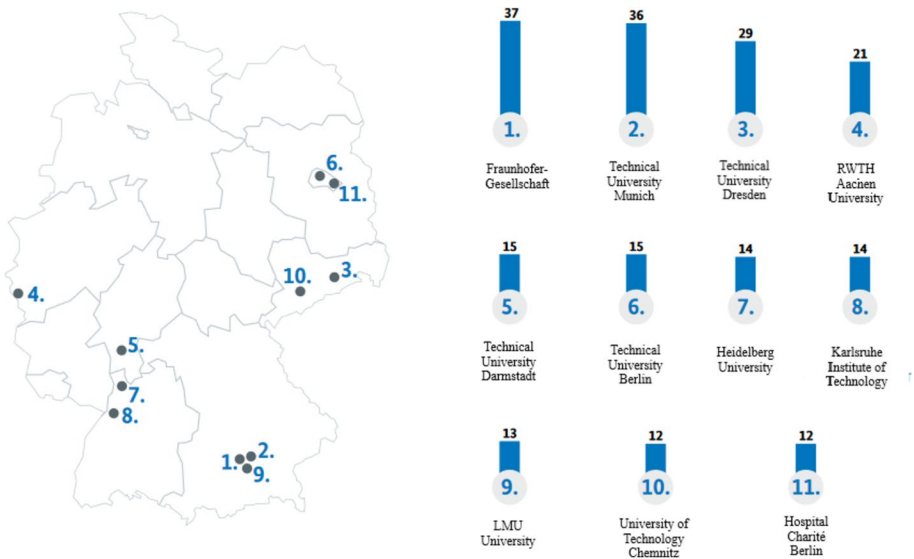
**Fig. 3** Startups by Origin in 2021 (Fichter & Olteanu, 2022)

environmental impact (Fichter & Olteanu, 2022). In the near future, a particular focus will also be placed on the concept of the circular economy. Between 2010 and 2020, nearly 2,400 new startups arose in the German circular economy (Prognos, 2020). That is 500 startups more than in the automotive industry. If we also consider startups in the area of repair services for metal products, machinery and equipment, there are another 250 to 300 new startups per year. Since 2013, repair services and the circular economy together account for more than 4,700 startups (Prognos, 2020).

An academic spinoff in this category that has an impressive success story is Shards, a company which produces tiles made from construction waste. By doing so, they give a second life to mineral waste materials that usually end up in landfills, while creating a circular system. Shards has been awarded the ‘Bundespreis Ecodesign’ and the ‘German Sustainability Award’ and was founded by three female entrepreneurs and supported by an EXIST Business Startup Grant (Federal Ministry for Economic Affairs & Climate Action, 2023d; Shards, 2023).

### 3.3 Gearing up for the future

Even though there was already a program for internationalization in 2015 called ‘EXIST-Startup Germany’, which allowed technology-oriented startups originally from Israel but founded in Berlin to apply for an EXIST grant, one central goal of the first pillar EXIST-Potential is to foster entrepreneurial universities in an international competition. With the goal of making Germany a global player in science-based startups, twelve lighthouse universities are promoted to support international founder teams in general, to prepare international market entries, to create networks with other universities abroad with an affinity for academic spinoffs and to form an entrepreneurial ecosystem (Federal Ministry for Economic Affairs & Climate Action, 2023a). The funded universities overlap to a high amount with the most successful institutions in applying for EXIST Transfer of Research grants over the last 15 years (Fig. 4). Noticeably, these institutions tend to be regionally clustered—a feature that should be analyzed in the future and addressed by the program.



**Fig. 4** Transfer of Research: The top ten by approvals 2007–2022 (Federal Ministry for Economic Affairs & Climate Action, 2023d)

An example of an internationally successful startup spawned by a German university is Celonis, a spinoff of the Technical University Munich that was supported by an EXIST Business Startup Grant in 2011. Celonis is a software company that developed a very successful process mining tool and an execution management system used by more than 1,400 companies to improve process efficiency and contribute to sustainability (Celonis, 2023; Federal Ministry for Economic Affairs & Climate Action, 2023f). With another investment of one billion in 2021, Celonis was the first German decacorn with a market value of 11 billion dollar (Capital, 2021).

As these examples and the timeline make clear, the EXIST program has been updated over time to better promote spinoffs from entrepreneurial universities that account for factors that are more aligned with the UN SDGs and not just bottom-line profits.

## 4 Conclusion

In summary, the proliferation and intensity of modern grand challenges, and the current broad public awareness of them, has resulted in a demand for entrepreneurship with an eye toward ESG matters, not just profits and economic gain. This realigned focus on impact-oriented entrepreneurship has significantly altered the way in which entrepreneurial universities address their third mission of service to society when it comes to economic applications. The overall paradigm shift toward an ESG orientation drives these entrepreneurial universities to structure their efforts in technology transfer and creating academic spinoffs to produce startups which heavily employ impact entrepreneurship and ESG principles. Governments could assist with this transition by creating funding programs, or updating existing funding programs, which favor the selection of impact entrepreneurship focused spinoffs that make use of ideas and knowledge from the university sphere. This paper contributes to this growing body of literature investigating these themes by using case study

methodology to explore the EXIST program from the German government. We show how it serves as a prime example of a financial mechanism that has evolved across multiple decades to more heavily incentivize academic spinoffs that place ESG at the core of what they do, in addition to the original goals of producing economic and technological development and increasing local, regional and national competitiveness.

These results have wide-ranging implications for policy and practice. The EXIST program exemplifies the ways in which university leaders and government policymakers can design academic entrepreneurship programs which are in step with the UN SDGs and produce ESG-minded spinoffs. The evidence displayed can also directly inform the work of administrators within technology transfer offices so that they can stay on top of this trend, or even be ahead of the curve, in incorporating these ideas into their startup coaching and advising best practices, encouraging potential founders to take a more holistic approach to their business models. Ultimately, these findings can aid universities in more thoroughly fulfilling their third mission to be of service to society, not only economically, but in a way which contributes to a more sustainable future.

This paper does bear a certain set of limitations, which then also inform pathways for potential future research. First, the scope of this paper is mostly limited to Germany, and future work could investigate funding programs from other countries to illuminate similarities and differences across locational contexts. Further, future studies could seek to identify and explain the relationship between entrepreneurial universities and entrepreneurial ecosystems that are intended to produce impact entrepreneurship, discuss matters relating to competing and complementary goals of impact entrepreneurship, discuss how impact is measured and attempt to observe paradigm shifts before and after the start of the EXIST program. Additionally, continuing research could look to analyze the effectiveness of some of the gender equality provisions, such as EXIST-Women, which have just recently begun and whose impact is yet unknown. Lastly, this study comes a particular moment in time amidst rapid change and holds limited predictive power regarding future developments. While this paper thoroughly details a trend that has developed since the turn of the century, current events and crises, and those to come, could have unforeseen effects upon the current momentum of ESG and impact-oriented spinoff activity at entrepreneurial universities.

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