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Structural change through innovation: New elements in funding guidelines

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Abstract: Policies aimed at supporting economically lagging regions have changed considerably in the past decades. This includes an increased link between innovation and regional policy, as well as more recently transformative policy. The WIR! Programme, funded by the Ministry of Research and Education in Germany, introduces several policy innovations in this regard, such as an explicit link between innovation and structural change, the emphasis on involving new (societal) actors, and a broad understanding of innovation. Although such innovations have the potential to provide a fresh start for policy-making, it remains an open question how applicants and programme administrations cope with a changing funding environment. This paper investigates – by examining applicant structure, project outlines, and funding decisions – how these new requirements are taken into account. While evidence in favour of a partial reorientation is found, the analysis reveals a strong continuity of established patterns and priorities, with many project outlines focusing mostly on technological innovation and relatively narrow stakeholder involvement. These findings suggest that while initiatives like WIR! may provide new impulses, it may take longer for applicants and programme management to adjust to changing policy paradigms.

1 Introduction

Although the aim to attain equal living conditions is laid down in the German constitution (Art. 91 a GG), economic well-being and prosperity are not evenly spread across German regions. There are regions that are regarded as structurally weak, measured in terms of unemployment, salaries, future development of employment and infrastructural endowment. The underlying reasons vary, but in most cases these regions can be linked to their location at the periphery or in rural areas with a low population density as well as to their character as old, industrialized regions. In particular, although more than 30 years have passed since the German reunification, many regions in Eastern Germany still suffer from the profound changes and have not yet been able to catch up. Structurally weak regions in Western Germany are predominantly characterised by low industrial activity or by industries with transformation needs such as the coal and mining sectors.

At federal level, for more than 50 years policy programmes have been implemented to overcome these weaknesses. In 2020, the 'Overall German support system for structurally weak regions' ('*Gesamtdeutsches Fördersystem für strukturschwache Regionen*') was established by the Federal Government to provide a framework for all governmental policy programmes targeting equivalent living conditions and to foster synergies among the various support measures in the responsibility of seven ministries. While some of these programmes provide preferential conditions for structurally weak regions, only a few programmes exclusively focus on them. These programmes can be assigned to both structural and innovation policy. Thus, traditionally two ministries, the Federal Ministry for Economic Affairs and Climate Action (BMWK) and the Federal Ministry of Education and Research (BMBF) have been responsible for these subjects. However, as the *Gesamtdeutsche Fördersystem* aims to foster synergies, the objectives of policy programmes may target both fields of structural and innovation policy. In particular, this is the case

with the programme family[1] '*Innovation & Strukturwandel*' (Innovation and Structural Change) which has been initiated by BMBF in 2017 with a pilot programme for '*WIR! - Wandel durch Innovation in der Region*' (Change by innovation in the region). '*Innovation & Strukturwandel*' is comprised of four individual programmes with different individual goals. Two funding rounds have been initiated so far, providing a total funding of EUR 500m. In addition to fostering structural change and innovation, contributing to sustainable transformation of regions is a further element of '*Innovation & Strukturwandel*' *and* a policy field which has only gained importance in recent years.

Against this background, policy programmes may be shaped by the strands of these different approaches. Thus, policy makers designing the programme, project management organisations (PTs) overseeing it, as well as regional actors applying for the funding and – if successful – implementing their projects may be faced – consciously or unconsciously – with difficulties in addressing these different objectives, i.e. promoting structural change, regional innovation, and sustainable transformation, simultaneously.

In the present paper, using the example of WIR!, we examine how actors respond to policy programmes which are aiming to combine these different strands of policy concepts at the regional level. Thereby, we seek to explore whether the turn towards more integrated approaches might lead to tensions between different objectives and pose a challenge for policy-makers, project management agencies and beneficiaries that need to adjust to the new realities of such cross-cutting programmes. Our empirical analysis is based on project outlines submitted to the funding body. At the core of the methodology is a quantitative text analysis of project outlines complemented by descriptive analyses of applicant details, logistic regression analysis and insights from interviews conducted in the context of an accompanying research project to WIR!.

The paper is structured as follows. Section 2 reviews the three traits and roots of structural, innovation and transformative policy at the regional level initiated by the German federal government. It also highlights the special features of WIR! as novel elements for both applicants and selection making and its application process. Section 3 describes the data, methods and concepts. Section 4 presents the empirical results, and section 5 critically discusses the methodological approach and summarizes the findings.

2 Federal policies addressing innovation and change in regions: The WIR! programme

2.1 Intersection of structural policy, innovation policy and transformative policy at regional level in Germany

Region-oriented policies have a long tradition in Germany. In a general understanding, regional structural policy includes all actions aimed at shaping the structure of an economy in a different way than would have resulted from the pure market economy process (Eckey 2005). In Germany, the Joint Agreement between the Federal Government and the federal states 'Improving the

[1] We use the expression of "program family" in order to indicate that four individual programs are implemented under the "umbrella" of 'Innovation and Structural Change'. Apart from WIR!, the three other program lines are RUBIN (*Regionale Unternehmerische Bündnisse für Innovation* / Regional Entrepreneurial Partnerships for Innovation), *Region.innovativ* (Innovative.Region) as well as *T!Raum* (Transfer Spaces for the Future of Regions) (https://www.innovation-strukturwandel.de/strukturwandel/de/home/home_node.html).

regional economic structure' (*Gemeinschaftsaufgabe 'Verbesserung der regionalen Wirtschaftsstruktur'* (GRW)) is the main funding instrument for supporting structurally weak regions. It has been introduced in 1969 (Klemmer 2005) and provides subsidies to firms that fulfil certain requirements. In addition, this agreement also supports infrastructure projects and further measures for enhancing the attractiveness of the location insofar as these measures are targeting the development of the regional economy. Since its introduction, the ultimate aim of this Joint Agreement was to promote income and employment (Brachert et al. 2020). The definition of structurally weak, thus eligible regions draws upon several indicators such as GDP level per employed person, labour market development or infrastructural endowment. Regions are ranked according to their performance, and this ranking is matched with the population target living in eligible regions.[2] Besides the Eastern Federal States, those regions are also located in the coastal areas of northern Germany, in the old industrialized areas of the Ruhr area as well as the Saarland, in the Bavarian regions bordering the Czech Republic and in sparsely populated areas of Northern Hesse and Southern Lower Saxony. The BMWK is responsible for implementing the GRW, under which e.g., investments of businesses and investments in municipal business-related infrastructure and energy infrastructure are co-financed.

Only since the 1990s has the regional level become a target for innovation policy (Koschatzky 2000). At that time, concepts like the cluster concept (Porter 1990), new industrial districts (see for instance Piore et al. 1984), innovative milieus (see for instance Camagni 1991) or regional innovation systems (Cooke 1992) were elaborated and informed policy making (OECD 2011). From different perspectives, these concepts focus on the role of networking, collaboration and localized learning to promote competitiveness and innovation (MALMBERG et al. 2006)

Actors to be involved in networking structures for regional development ideally stem from different backgrounds. The contributions on the role of triple-helix structures of university, industry and government (Etzkowitz et al. 1995) and on the relevance of the third role of universities (Conway et al. 2009; Gunasekara 2006; Jaeger et al. 2014) have been pointing to important addressees of regional innovation policy. Against the background of the German context, 'university' should be understood more broadly as the scientific sector, which is also comprised of publicly funded research organizations (Beise et al. 1999). More recently, the triple-helix was broadened to the so-called quadruple helix structure to point to the role of further actors like intermediaries, associations or civil society organizations in innovation activities (Carayannis et al. 2009; Galvao et al. 2019; Koschatzky et al.; Miller et al. 2016).

Although it has been manifold proven that spatial proximity of collaborating actors in innovation processes should not be overrated (Boschma 2005a; Meyborg et al. 2014), policy-making in this line builds on the assumption that building and raising endogenous potentials may be more fruitful in the long run compared to merely transferring resources (Hassink et al. 2021). This is not only rooted in reflections on knowledge spillovers (Audretsch et al. 1996) but also to cultural factors and trust (see the discussion on different dimensions of proximity, Boschma 2005b). Policies in support of regional development have implemented those concepts for instance through cluster support programmes, place-based approaches (Barca 2009) or smart specialization (Foray et al. 2009).

In Germany, the ideas of these innovation policy concepts were taken up by policy makers and transferred, e.g., into cluster policies (Eickelpasch et al. 2005) or programmes addressing specific

[2] The GRW is embedded in the European Structural policy, and the share of the national population benefitting from regional aid is defined in the Regional Aid Guidelines. These Guidelines also define the intensity of aid that can be granted to enterprises in different size classes. The Regional Aid Guidelines are transferred to the German case through the Coordination Framework of the Joint Agreement 'Improving the regional economic structure'.

aspects like human capital formation or absorptive capacity (Koschatzky et al. 2018). The BioRegio Contest, initiated in 1997, was the first policy programme aiming at the promotion of networking activities among firms and scientific institutions within regions by the BMBF. In 1999, the approach was taken up within the so-called InnoRegio Contest to initiate networking among businesses and science in Eastern Germany (BMBF 2005; Eickelpasch et al. 2003). InnoRegio is part of the programme family '*Unternehmen Region*' (Entrepreneurial Regions), which was comprised of further programmes like *Innovationsforen*, *Innovative regionale Wachstumskerne* or *Zwanzig20*. Funding provided by *Unternehmen Region* expired in 2022. InnoRegio aimed to foster cooperation and networking among actors within regions and, thereby, initiate learning processes. To this aim, firms, higher education and research institutions, or other actors engaged in innovation activities were asked to submit an application describing the regional profile and innovation potential as well as ideas for furthering cooperation.[3] The applicants should delineate the regions based on functional relationships. In accordance with the competitive procedure, 23 regions were ultimately selected in a three-stage application process to implement the concepts developed within this process. In the framework of InnoRegio, innovation is defined as new products, production processes and services. Overall, in many regions '*Unternehmen Region*' contributed to developing competitive centres of research and innovation (BMBF 2022, p. 118). A subsequent programme family, '*Innovation & Strukturwandel*' (Innovation and Structural Change) has been initiated in 2017 with the WIR! programme. It broadens the regional focus to also include structurally weak regions in Western Germany.

With the rise of challenged-oriented (Boon et al. 2018; Daimer et al. 2012) and mission-oriented innovation policies (Janssen et al. 2021; Larrue 2021; Mazzucato 2018; Robinson et al. 2019; Wittmann et al. 2021), innovation policy has increasingly shifted its focus from economic considerations of growth and competitiveness towards contributions to societal challenges (Schot et al. 2018) and the question of transformational instead of market failures (Weber et al. 2012). Among the key characteristics of such new mission-oriented policies are transformative far-reaching goals and a cross-policy approach cutting across established policy fields. Due to their orientation towards addressing societal goals, mission-oriented policies have a directional character, based on ambitions, goals, and paths toward achieving them.

While initially being mainly considered as a policy for national governments, there is an increasing variety of implementation efforts at different levels. First reflections on this new paradigm criticized this approach from an economic geographic perspective as being space-blind and top-down driven (Bugge et al. 2022; Coenen et al. 2015). But in the course of the further development of the concept, efforts to reconcile the concept of mission-orientation and transformative policy-making with a spatial dimension pointed to different levels of problems and ambitions to their solution at specific territorial levels (Uyarra et al. 2023). More recent contributions in the field also try to establish the link between mission-oriented policy and cohesion policy, pointing to potential synergies and possibilities for mutual learning (Cappellano et al. 2023) and thereby reaching beyond traditional innovation policies and promoting a cross-sectoral and multi-actor based approach cutting across established lines of policy fields.

Further, transformation-oriented policies take a rather forward-looking perspective on societal and socio-economic development. Contrary to structural policy that is primarily focused on territories with difficult (mainly) economic structures, as explained above, transformative policies focus on specific future targets to be reached. Thus, policy measures may not only be implemented to promote regions which are characterized by structural deficits, but also to facilitate

3 In contrast to programs with a specific technology focus like BioRegio, whose aim was to use public funds to boost the introduction and development of biotechnology in Germany, InnoRegio was open to all fields of technology. For a comparison of these approaches, cf. Dohse (2001).

structural change in those regions which are about to face disruptions. This may be due to the political decision to terminate environmentally harmful activities like brown coal extraction or industrial modernisation requirements such as in the automotive industry. In these contexts, innovation-based structural change - in the sense of precautionary structural policy towards change - may support sustainable transition and new path creation in order to prevent structural crises (Gärtner 2014, 2019).

2.2 Structural change through innovation - novel aspects of the German WIR! programme

The WIR! pilot programme started in 2017 (WIR!1) and was further extended for all regions in Eastern Germany in the same year. Two years later, a second call (WIR!2) was published that allowed alliances of actors from structurally weak regions in Western Germany as well as in Eastern Germany to apply for funding, i.e. from all regions characterised as structurally weak in the Coordination Framework of the Joint Agreement 'Improving the regional economic structure'. With regard to the content design of the call and the application process both funding rounds are highly similar.

The WIR! programme aims to promote innovation activities in specific thematic fields by regional alliances. Diverse actors like companies, higher education and research institutions, and civil society were called to form these alliances whereas 'regional' refers to the area where these actors are located. Thus, a WIR! region is not delineated by administrative boundaries, and several regional alliances may be formed independently in the same place. A region is thus defined as a functional space that is delimited by the relationships between the actors, whereby a critical mass of actors should be present. Together, the members of an alliance define an innovation field that shall be elaborated further in research projects. WIR! is based on a broad understanding of innovation including technological, organisational, product, service, and business process as well as social innovations.[4] The fields of innovation are to represent a new approach that stands out clearly from the previous direction of development in the region.

Examining the specific wording of the calls helps to describe the particularities of WIR! in detail. Table 1 provides an overview of the most characteristic idioms of the two WIR! funding guidelines. That means that these terms are not the most widely used but may be regarded as a distinct feature of the programme. "Region" or "regional" occurs in relation to "regional structural change", "structurally weak rural regions", "regional actors" or "old industrialized regions". "Innovation" is described as the key to promote wealth and quality of life. The idiom is often combined with other terms like "ability to innovate" or "innovation potential", and the calls ask specifically to establish "concepts for regional innovation" focusing on the so-called "field of innovation". As mentioned above, the innovation concept is defined according to the OECD definition (OECD et al. 2018). Another element characterizing WIR! is "cooperation" (*Zusammenarbeit*) among actors. These actors shall be part of science, business and society, reflecting the role associated with quadruple helix structures for innovation activities. The call documents of WIR!2 are even more precise about which societal actors could be involved as it refers to associations, federations as well as civil society organizations in particular. Eventually, these actors shall establish "broad-based regional alliances". Interestingly, although cooperation among these actors is described as a means for transferring knowledge and technology in the literature,

4 Social innovation was recently introduced in BMBF funding rationales, see also the Ministry's strategy on social innovation and social entrepreneurship, https://www.bmbf.de/SharedDocs/Downloads/de/2023/230912-sigustrategie-download.pdf?__blob=publicationFile&v=5.

the term "transfer" is not mentioned in the calls. "Sustainable" (*nachhaltig*) is another phrase characterizing the funding guidelines. While WIR!1 is rather imprecise regarding how the idiom shall be interpreted (e.g. "sustainable impulses for development" are mentioned), WIR!2 specifically mentions the Sustainable Development Goals (SDGs) as an orientation for the themes of the fields for innovation. The term "transformation" as such is not mentioned yet.

Table 1: Most characteristic idioms of the WIR! funding guidelines

Expression	Translation
Region / regional	Region / regional
Strukturwandel	Structural change
strukturschwach	Structurally weak
Innovation / Innovationsbegriff: technologische, organisatorische, Produkt-, Dienstleistungs- und Geschäftsmodellinnovationen als auch soziale Innovationen	Innovation / innovation concept: technological, organizational, product, service and business model innovations as well as social innovations
Innovationsfähigkeit	Ability to innovate
Regionale Innovationskonzepte	Concepts for regional innovation
Innovationspotenziale	Innovation potential
Innovationsfeld	Field of innovation
Zusammenarbeit zwischen Wissenschaft, Wirtschaft und Gesellschaft	Cooperation between science, business and society
neue Kooperationsbeziehungen (zwischen Unternehmen, Hochschulen und Forschungseinrichtungen, Gesellschaft (WIR!1) bzw. Vereinen, Verbänden und zivilgesellschaftlichen Organisationen (WIR!2))	new cooperative relationships (between companies, universities and research institutions or society (WIR!1) resp. associations, federations and civil society organizations (WIR!2))
breit aufgestellte regionale Bündnisse	Broad-based regional alliances
nachhaltig	sustainable

Source: own analysis

In essence, WIR! has a set of central characteristics, that, in part, represent a novel approach. Firstly, as the name of the programme family 'Innovation and Structural Change' already indicates, regional innovation and structural policies are combined to promote prosperity and employment in regions that are faced with structural deficits. In addition, although the term 'transformation' is not mentioned specifically in the call, as shown above, the direction of development ought to contribute to sustainability. Also, on its website BMBF refers to the contribution that '*Innovation & Strukturwandel*' shall make to the transformation of regions[5]. Secondly, not only innovation activities targeting technological development may be funded but a comprehensive understanding of innovation is underlying the call. Yet, the innovation fields should raise innovation potential in realms that are new to the region. Thirdly, a wide range of actors is addressed to participate and cooperate in the regional alliances, i.e. companies, universities and research institutions, associations, federations and civil society organizations as well as actors who are "inexperienced in innovation".

5 https://www.bmbf.de/bmbf/de/forschung/zukunftsstrategie/innovation-strukturwandel/transformation-von-regionen_node.html.

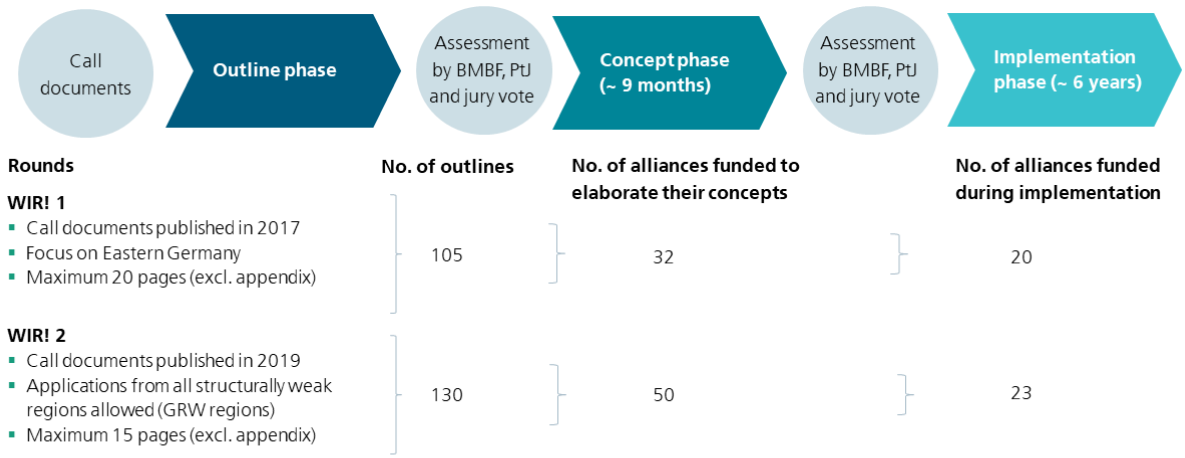
Against this background, we aim to investigate the extent to which those applying for funding, as well as those involved in the subsequent selection process, react to these different and partly new requirements. To this end, the overarching research objective is subdivided into a set of research questions:

1. What kind of applicants respond to the call and hand in an outline to apply for funding? What is the structure of regional consortia?
2. How do applicants address the topics of innovation, structural change and new stakeholders?
3. To what extent are new requirements and priorities affecting funding decisions?

3 Data, methods and concepts

The application process of the funding programme was organized as a multi-stage process (figure 1). The regional alliances were asked to prepare an outline describing, among others, the region and the field of innovation as well as its contribution to structural change. While the content requirements for the outlines do not differ between the two rounds of WIR!, the maximum length of 20,000 words in the first round is 5,000 words higher than in the second. After a positive assessment by the BMBF, the Project Management Organisation and a jury comprised of members from science and regional strategy consultants, the alliances receive funding for the concept phase of 9 months, allowing them to further elaborate on their concepts. A positive assessment of the concepts would then allow them to benefit from funding for implementing the projects over a period of six years, allocating (substantial) public funds to innovation projects in the beneficiary regions. Altogether, 105 outlines were handed in for the first phase of WIR!1. Out of these, 32 were selected to further elaborate on their concepts during the so-called concept phase. Eventually, in 2019, 20 regional alliances were awarded to benefit from funding to implement their concepts over a maximum of six years. In the same year, the second call was announced. In particular, the programme aimed at rural areas, mountainous and coastal regions as well as old industrial conurbations and the structural weak brown coal region in all parts of Germany that are eligible for funding. A total of 130 outlines were handed in. Thereof, 50 alliances benefitted from funding during the conceptual phase and out of these, in 2021, 23 were elected to benefit from the perennial support. The subsequent analysis focuses on the first step, thus, the outlines.

Figure 1: Application processes during the two rounds of WIR!

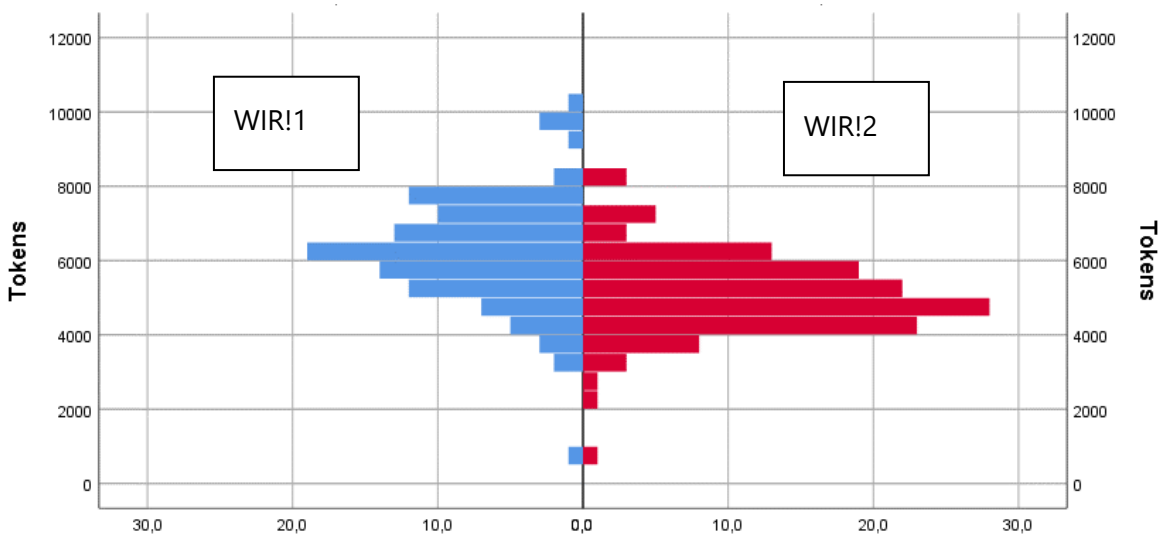


Source: own figure

The main source of text analysis is the 235 project outlines submitted for the first selection step in both funding rounds of WIR!, providing the initial description of the project. These project outlines were limited to 20 pages (WIR!1) and 15 pages (WIR!2) respectively, requiring applicants to describe the region, field of innovation, envisaged activities and partners. As project descriptions were provided in heterogeneous forms (partly including non-readable pages/documents or appendices), all documents were manually reduced to the core project description and subjected to optical character recognition (OCR) wherever necessary. The core project description excludes cover pages and appendices like more detailed work plans, descriptions of partners, and letters of intent.

As can be seen from figure 2, the majority of project outlines comprise between 4,500 and 6,500 tokens (words/punctuation/numbers). The shortest project description consists only of 824 tokens (21 sentences) basically asking for the possibility to submit a comprehensive outline after the official deadline, while the longest project description exceeds 10,000 tokens within 340 sentences.

Figure 2: Word frequency by submission



Source: own analysis

The analysis was carried out with the statistical software R and the package Quanteda that was developed for quantitative text analysis. Subsequent analysis also involves additional characteristics of individual projects such as geographical location, lead applicants and core partners of a project etc. that were merged with the results of the content analysis. Information on projects was gathered by desk research and the project descriptions by the research team involved. These methods were used in order to get insights and to deepen knowledge about the question of if and to what extent the above-mentioned new elements were translated into project outlines and were envisaged to be realised in the case of being selected for the next funding round. However, this question should also include the fact that outlines were selected by a jury for further support. So not only the applicants, but also the involved selection and awarding procedures need to be kept in mind when interpreting the findings. Consequently, text analysis methods were used in order to deepen the understanding of if and how applicants have transferred the funding principles into their description of the proposed projects. Thus, since project outlines, i.e. the first step of the whole selection process, were used for the analysis, we can only refer to the text-wise translation of the funding body's programme philosophy. This also implies that applicants may use certain key expressions in a strategic sense. On the other hand, implicit

meanings of text parts cannot be included in quantitative text analyses. This means that the subsequent analysis targets the question of how applicants take up and "translate" the funding guideline into their proposal texts and their collaborative innovation project ideas.

Insights from quantitative text analysis were complemented by two additional sources of data. First, a comprehensive database on project applications including the classification of lead applicant(s), spatial location and size of the consortium was set up based on manual analysis of the documents. For the logit analysis, additional information concerning applicants location were added to this database. Moreover, the analysis builds on more than 20 interviews that were conducted in the scope of the accompanying research project IMPER which were re-analysed to test/corroborate the quantitative findings of the analysis.

4 Empirical analysis

In this section we explore the three overarching research questions of this contribution, looking at different elements. First, we take a look at applicant data to understand what kind of applicant types were motivated to submit project outlines in the context of WIR and whether there are specific regional structures. Second, by means of quantitative text analysis we scrutinize to what extent and how project outlines deal with the topics of innovation, structural change and new stakeholders that represent the three major innovations of the WIR programme. Thereby, we investigate to what extent these concepts experience an uptake in the way applicants portray their projects. Third, by looking at the determinants of the selection process, we seek to understand to what extent these new priorities in WIR affect the success of the outlines in terms of being selected for further funding.

4.1 Applicants

In a first step, we zoom into project applications by inquiring about the previously identified three key novelties across all of the 235 submitted project outlines. We differentiate between the levels of engagement within the alliances. Concerning the type of applicants, lead applicants are those actors that handed in the application and are named as the key contact whereas core partners are stakeholders that are named in the outline as intended members of the alliance. While focusing in general on how applicants deal with these emerging new requirements, for the analysis we also explore differences across different types of lead applicants. To this end, we divided all applicants into three groups: private enterprises, R&D institutions like higher education and public research institutions as well as public and private intermediaries. The latter category is mainly comprised of local authorities, business promotion agencies as well as associations with an intermediary function. We assume that lead applicants play a key role in shaping priorities of projects and might have different perspectives on these key aspects (cf. table 2 for an overview).

Table 2: Lead applicants and their regional embeddedness in WIR!1 and WIR!2 - a short overview (numbers of applications)

		WIR!1	WIR!2	Total
Lead applicant	Private Enterprise	16	23	39
	R&D institution	42	55	97
	Public and private intermediaries	47	52	99
Territorial origin of lead applicants	Eastern Germany	100	54	154
	Western Germany (incl. Berlin)	5	76	81

Source: own analysis

Further aspects that are taken into consideration are the different territorial origins of applications and therefore potential differences in applications for funding (Eastern or Western Germany) and differences across the funding periods that may stem from slight variations in the regulations of and the call for applications between WIR!1 and WIR!2, such as different text lengths (see above).

Looking at the regional background of the lead applicants, table 3 shows that lead applicants are located in all different types of counties. Although large independent cities are the least frequent type of structurally weak regions in Germany, most lead applicants are located in this type of region. This finding underlines the advantage of density and exceeding a critical mass as well as agglomeration effects when it comes to innovation. Nonetheless, even in sparsely populated rural districts there are actors that joined forces to draftan outline to promote structural change and innovation.

Table 3: Location of lead applicants by type of district

Type of district	WIR!1	WIR!2	Total
Sparsely populated rural district	24	25	49
Rural district with densely populated areas	31	28	59
Urban district	7	31	38
Large independent city	43	46	89

Source: own analysis (This classification is based on the types of districts according to settlement types, developed by the Federal Institute for Research on Building, Urban Affairs and Spatial Development).[6]

With regard to the core partners, there are 12 outlines in which no core partner is named, so that finding core partners would be a major task of the concept phase. Altogether, 576 core partners are referred to in the outlines. About 50% of the outlines specified two core partners, followed by 20% with one core partner. As described above, public and private intermediaries are the most frequent type of lead applicant. Core partners, on the other hand, are predominately R&D institutions, followed by other private enterprises (table 4). Nonetheless, in comparison to the share of private enterprises among lead applicants, the share is higher among core partners. This observation applies above all to WIR!1.

6 Cf. https://www.bbsr.bund.de/BBSR/DE/forschung/raumbeobachtung/Raumabgrenzungen/deutschland/kreise/siedlungsstrukturelle-kreistypen/kreistypen.html;jsessionid=F964884C46BBC98B401DDC4539E4E9CD.live11311.

Table 4: Core partners in WIR!1 and WIR!2 by type (numbers of core partners)

Type of core partner	WIR!1	WIR!2	Total
Private Enterprise	94	61	155
R&D institution	114	105	219
Public and private intermediaries	99	103	202

Source: own analysis

4.2 Project outlines - WIR characteristics

4.2.1 Types of innovation

As explained above, one key characteristic of WIR! is a broad understanding of innovation, subsuming also non-technological and social innovation as areas eligible for applications. Investigating the type of innovations referenced in the project applications based on an inductive keyword analysis, table 5 displays the types of innovation identified in the project outlines. Overall, the analysis identified 12 types of innovation referring to the type (e.g. economic, technological) or area (e.g. digital, green) of innovation.[7]

While economic, technological and process-based innovation as representatives of a rather traditional understanding of innovation processes are the most common types, a considerable number of project outlines also contain references to social (15.7% of all outlines) and multiple types of innovation (17.4% of all outlines). Moreover, 46.4% of the outlines refer to more than one type of innovation,[8] supporting the argument that the call generally managed to mobilize a broader set of outlines. In this regard, it is noteworthy, that social innovation co-occurs specifically with technological (r(df)=.2097, p<0.01), economic (r(df)=0,1712, p<0.01), cross-cutting (r(Df)=.3862, p<0.01) and non-technological (r(df)=.1522, p<0.05) innovations, not indicating a clear division between technology-based innovation on the one hand, and a broader understanding on the other. Instead, almost half of the outlines (18 out of 37) referring to social innovation include a link to technological innovation as well. Less co-occurrence can be observed e.g. for digital and green innovation that seem to characterize a specific subset of project outlines and occur in relatively similar frequencies across different applicant types.

Table 5: References to different types of innovation in the project outlines

Type of innovation	Document frequency	% of outlines
Economic innovation	77	32.77
Technological innovation	69	29.36
Process innovation	65	27.66
Cross-cutting innovation (combining multiple elements)	41	17.45

7 The category "other types of innovation" contains innovations from individual contexts that were mentioned only in single outlines.

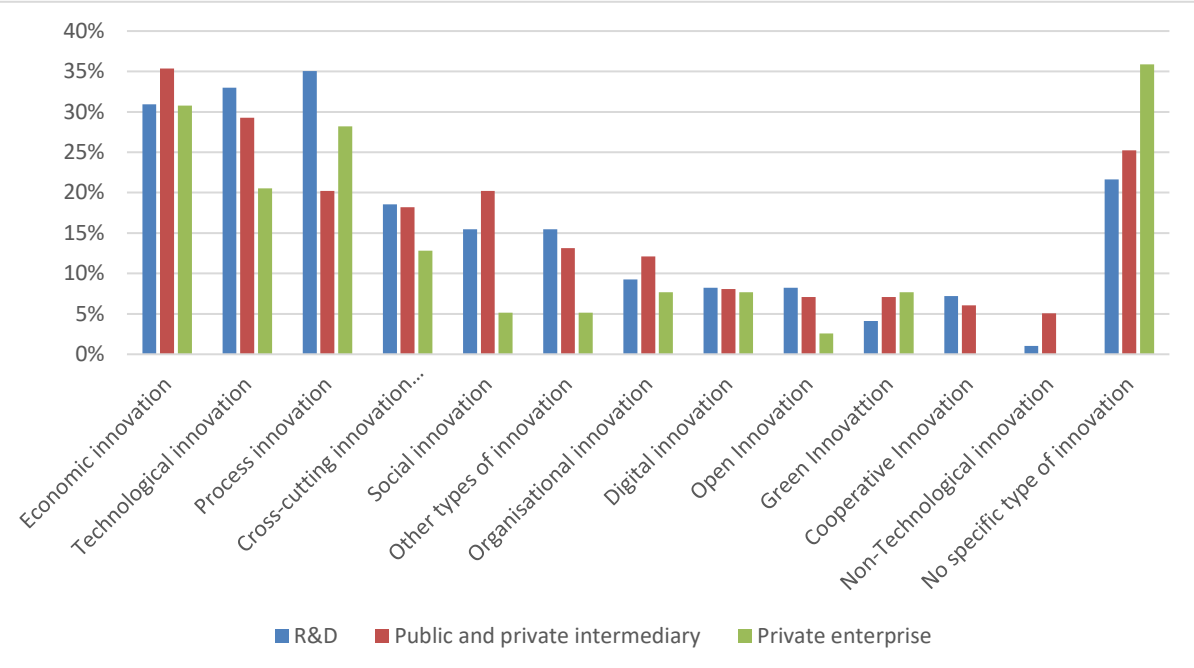
8 One the other side of the spectrum, 28.1% of the outlines refer to one innovation type, while 25.5% do not mention any specific type of innovation.

Type of innovation	Document frequency	% of out-lines
Social innovation	37	15.74
Other types of innovation	30	12.77
Organisational innovation	24	10.21
Digital innovation	19	8.09
Open innovation	16	6.81
Green innovation	14	5.96
Cooperative innovation	13	5.53
Non-technological innovation	6	2.55

Source: own analysis

While these results suggest that many outlines indeed hint towards a broader understanding of innovation, embedding the planned activities in different spheres of innovative activities, the analysis revealed considerable variation with regard to the lead applicant of outlines (cf. figure 3). While the relative share of outlines of each type of lead applicant (R&D institutions, private enterprises, as well as public and private intermediaries) referring to different types of innovation in general seems to be comparable, especially private enterprises tend to refrain more often from referring to any distinct type of innovation. Only two out of 39 (5.1%) outlines include references to social innovation, while this is the case for 15.5% of outlines with a R&D institution leading the outline and even 20.2% for public and private intermediaries. At the same time, in 60 of the project outlines (25.5%), no distinct type of innovation could be identified (despite a context analysis of the keyword 'innovation'). While the lack of distinct types of innovation seems to be associated with the length of project outlines (specifically in the second round of WIR!) there are no specific differences between types of lead applicants.

Figure 3: Share of outlines referring to specific type of innovation by lead applicant



Source: own figure

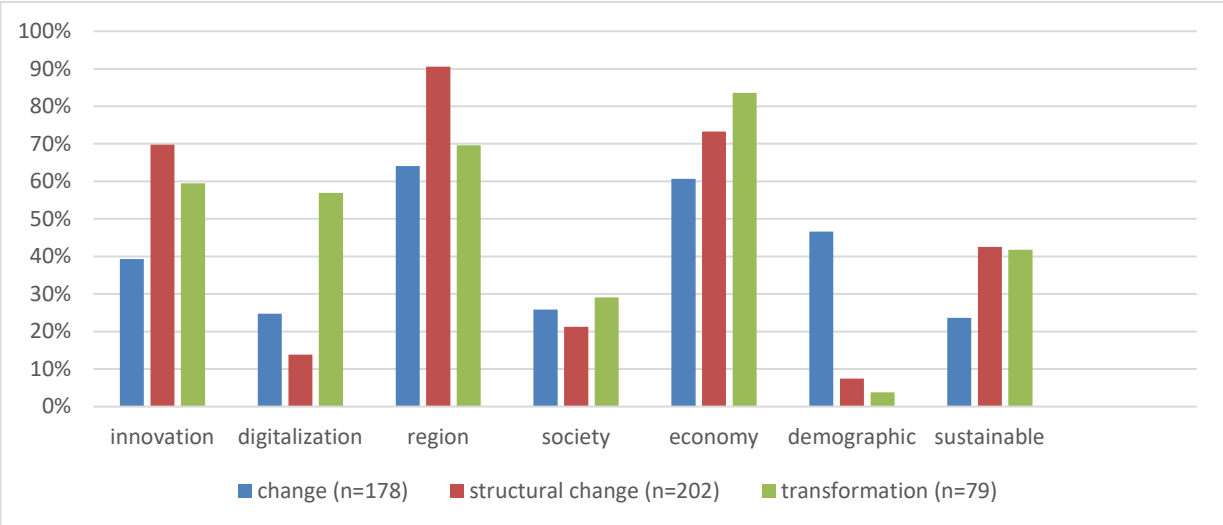
4.2.2 Structural change

One key and novel characteristic of WIR! is the explicit link of structural change with innovation, going beyond a "traditional" understanding of structural change (as shortly evoked in the introductory section of this paper). To better understand to what kind of topics change processes are linked, we investigated the co-occurrence of words with three major terms describing change processes: structural change, change, and transformation.[9]

Despite the explicit reference of the WIR! programme to change, the analysis of the project outlines reveals that there are more references to structural change (86.0%) compared to change as such (79.6%). Transformation, not being explicitly mentioned in the call, is only present in 43.3% of the outlines. There is little indication that there are distinct patterns with regard to applicant type, East/West Germany, the edition of WIR! or the type of district of the lead applicant.[10]

Following the project call, it comes as no surprise that outlines referring to structural change also have an explicit link to the regional dimension (e.g. "regional change"), with 91% of outlines exhibiting this combination. The innovative approach of WIR!, trying to link innovation and structural change, is somewhat lower, however, still 70% of relevant project outlines refer to innovation in this context, indicating that applicants tried to follow this link. While relative shares in most instances do not differ considerably among change processes, two topics stand out starkly: digitalization is clearly linked with transformation, and demographic change seems to be a recurring topic in the context of the rather broad term of change (see figure 4).

Figure 4: Relative frequency of documents with reference to change processes for different thematic areas (window=10)



Source: own figure

9 Using a window of ten tokens before/after the term change/structural change/transformation. Using a window of fives words instead reveals a similar pattern, however, with lower coverage.

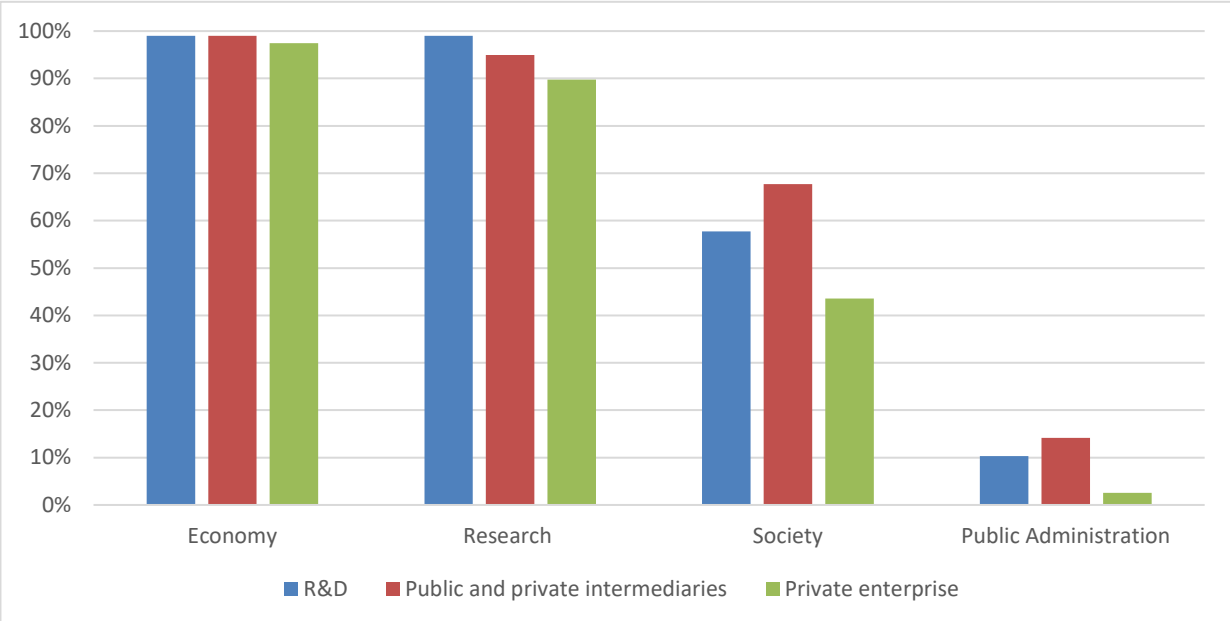
10 The only exception is the term transformation that is occurring more often in Eastern Germany, however, not being statistically significant at the 95% significance level.

4.2.3 New stakeholders

A second key feature of the WIR! programme is its aim to reach beyond established actors and particularly include those actors that so far have had little connection with innovation processes. Moreover, the broad understanding of innovation implies a stronger involvement of societal actors, in particular civil society. To better understand the potential scope of outlines, we explored to what extent the analysed documents refer to different key stakeholder groups (economic actors, research, society, and public administration). Despite the explicit reference of the call to non-experienced innovation actors, this term is rarely mentioned, being only present in 11 out of 235 outlines.

As can be seen from figure 5, almost all outlines refer to economic actors and research institutions, regardless of the type of applicant. This reflects a rather narrow understanding of innovation.[11] In contrast, references to society and public administration are far less frequent and show considerable variation across types of lead applicants. Whereas there is a reference to society in 67.7% of outlines from public and private intermediaries and 57.7% from R&D institutions, for outlines prepared by private enterprises the share is only 43.6%. A similar picture emerges with regard to public administration, however, at considerably lower levels, as even among public and private intermediaries only 14.1% of project outlines refer to key terms from this field. Whereas references to public administration tend to occur relatively more frequently in outlines submitted by lead applicants from Eastern Germany (13.0% compared to 6.2%, sign. 0.107), references to civil society/citizen occur significantly more often in outlines from Western Germany (67.9% vs. 55.2%, ttest, sign. at 0.1 level). This could indicate a stronger collaboration among different types of actors in Eastern Germany, for instance originating from existing network relations or resulting from a specific collaboration culture and/or experience from former funding programmes and established routines in cooperation.

Figure 5: Reference of outlines to key stakeholder groups by type of lead applicant



Source: own figure

11 However, public and private intermediaries" less often refer to small and medium-sized enterprises (SME): 62 of 99 outlines compared to research and development organizations (78 of 97 outlines) and private companies (28 of 39 outlines).

Overall, the results of this analysis indicate that the majority of applicants have taken into consideration the novel character of the programme, reflecting the new priorities at least at a general level. Generally, outlines show broad references to different types of innovation (with the slight limitation of outlines led by private enterprises that more often than other lead applicants refer to no specific type of innovation and also have lower references to social innovation). Specifically referring to social innovation, in addition to the lower occurrence in outlines led by private enterprises, this innovation type does not seem to be a dominant feature of propositions led by research organisations, at least not in a broad sense.

In total, links to innovation and structural change are obvious. The key expressions of the funding guidelines have been adopted in most of the outlines, but a high amount of rather "classical" project outlines (in the sense of projects targeting technological, economic, and process innovations) were also submitted.

However, as table 6 shows, there is a considerable share of project outlines that only refers to a single or even no specific type of innovation (53.6%) and only mentions economic/scientific actors (39.1%) or do not emphasise any link to innovation and structural change (40%). Further analyses indicate a high consistency between these different dimensions, with 27 out of 235 (11.5%) outlines not entailing any of these characteristics and 71 (30.2%) only one, thus more than 40% of outlines exhibit a rather limited fit with regard to some of the key novelties of the programme.

Table 6: Overview of the extent to which the outlines address novel aspects (number of outlines)

Novel aspects of innovation	Addressed in outlines	Not addressed in outlines
Broad understanding of innovation	109	126
Broad reference to different stakeholder groups	143	92
Link of innovation and structural change	141	94

Source: own analysis

4.3 Selection of project outlines

In the final part of the analysis, we aim to explore to what extent the (novel) characteristics of the WIR! funding scheme affect funding decisions. Thus, the analysis investigates whether/to what extent the newly postulated goals are relevant for the decision whether a project receives funding for the concept phase. We use a binomial logistic regression to examine the determinants of deciding about the success of an outline for the subsequent funding phase. As described above, 82 out of 235 (34.9%) project outlines advanced to the next selection stage. Whereas only half of these projects were selected for full implementation, the initial selection phase (concept phase) can be considered as a first filter, identifying generally fitting project outlines. From this perspective, it appears particularly promising to explore references of the outlines to the key priorities of WIR!, as these can be considered as a first indicator of fit, whereas the overall project quality cannot be directly grasped by quantitative methods.

For the statistical model, we combine several groups of control variables (for an overview see annex 2). First of all, outline success might be driven by the characteristics of the documents that were retrieved from quantitative text analysis. A first indication of quality can be the length of texts, which suggests that more comprehensive project outlines are on average better

developed.[12] Secondly, WIR! propagated a broader understanding of innovation going beyond a classical, narrow understanding of innovation. To test whether project outlines representing a broader understanding are more likely to receive funding we, on the one hand, control for the number of explicit references to distinct types of innovation (none/one/more than one), expecting that particularly projects referring to more than one type of innovation tend to be more successful. On the other hand, we explicitly examine whether a reference to social innovation, which can be seen as highly representative for a broader understanding of innovation, increases the success rates of project outlines. To cover the second characteristic of WIR!, the idea of involving a broader range of stakeholders, we include a dummy variable indicating whether a project outline referred to new stakeholder groups (e.g. citizens, public administration), expecting a positive effect of these stakeholder groups on funding allocation. Thirdly, to investigate the nexus between structural change and innovation, we add two additional variables: a dummy variable exploring whether there is a link made between these two expressions in the outlines, as well as a count for innovation-related expressions (adjusted for text length), assuming that both low and overall high frequencies negatively affect outline success, as projects either lack the embedding into the innovation context or overly focus on innovation neglecting other dimensions (particularly structural change).

Besides these characteristics of the project outlines, we include additional controls for applicant characteristics that might affect funding outcomes.[13] In particular, we add a variable describing the lead applicant (R&D institution, private enterprise as well as public and private intermediaries), assuming that particularly higher education and other research institutions possess considerable experience with grant applications and therefore might have a competitive advantage for setting up such regional alliances. Moreover, we control for the size of the consortium, assuming that larger consortia - when not taking into consideration the size of players and the quality of engagement - might indicate a higher degree of representation of key actors from a given region. Finally, the model includes two further variables taking into consideration potential influencing factors at political level: First of all, spatial distribution of funding allocations might to a certain extent be an implicit goal, so that a high number of applicants from a certain region might decrease individual perspectives for obtaining funding, as applications might be compared against other applications from the same district of the lead applicant. Moreover, party politics was found to affect funding allocation at different levels (Kemmerling et al. 2006). Taking the argument of Rodriguez-Pose as a starting point (Rodríguez-Pose 2018), one might expect that regions with high levels of frustration tend to support populist or extremist parties. Taking the district-level vote share of the Alternative für Deutschland (AfD) as a rising party in the 2017 federal elections might indicate whether additional funding was particularly allocated to regions that may be considered as being under high pressure/facing particularly high frustration.

The results of the analysis are presented in figure 6 as average marginal effects to allow for easier interpretation (Model results can be found in the appendix). Looking first at the determinants of the project outlines, several findings can be derived. First of all, project length appears to be a strong determinant of outline success, with longer outlines being considerably more likely to obtain funding. An increase of the (logarithmic) number of words in an outline from the mean by one standard deviation increases the probability of obtaining funding from 34.7 to 47.6%. The understanding of the programme as an innovation-driven programme, i.e. referring to innovation in various forms, manifests itself in an inverted U-shaped curve with differences in

12 To account for differences in the terms of applicants, geographical scope etc. we add a dummy variable for the different WIR! funding rounds.

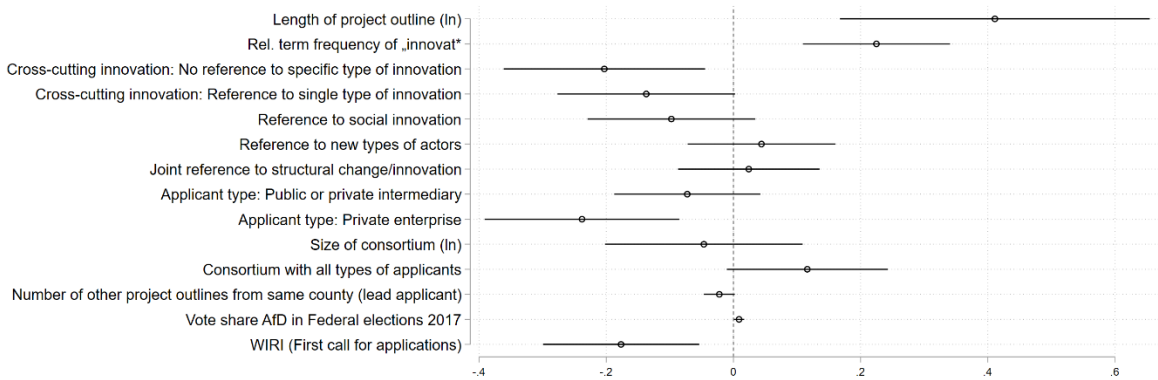
13 We also explored further socio-demographic controls that had no relevant explanatory power.

predicated probabilities reaching from 5.4 to 48.6% success probability. However, the result in relation to a broader understanding of innovation is not clear. Whereas neither references to a broader set of involved stakeholders, nor societal innovation indicate a substantial effect on allocation outcomes, projects referring to a range of different innovation types can be considered as being more successful. Compared to project outlines that refer to at least two types of innovation, those not listing any type are 20.3 percentage point less likely to obtain funding, and for those only referring to one type of innovation the difference is 13.7 percentage point (significant at the 90% confidence level). Moreover, there is little evidence that a dedicated combination of structural change and innovation is exerting a positive effect for outlines being selected for further funding.

While the size of consortia as such does not have any substantial effect on funding decision, particularly the type of applicant seems to play a crucial role. Compared to R&D institutions that can be considered highly experienced in applying for funding, particularly private enterprises appear to be disadvantaged, having ceteris paribus a 23.8 percentage point lower probability of obtaining funding. For public and private intermediaries, the probability is slightly lower than for R&D institutions, but without being statistically significant.

Moreover, there is weak indication (significant at 90% confidence level) for two additional controls. Consortia combining key partners from R&D, private enterprises as well as public and private intermediaries have an 11.6 percentage point higher probability of being selected for the next funding stage. For each additional applicant, funding probability decreases by about 2.2 percentage points. Finally, the analysis hints at the relevance of additional political considerations in the allocation process, at least for WIR!1. Higher electoral support for the AfD as a proxy for potential frustration/protest voters is associated with a significantly higher probability of obtaining funding: a one point higher electoral support increases the probability of being selected for funding by 2.1 percentage points.

Figure 6: Average marginal effects for variables (without interaction effects)



Source: own analysis

The logit model illustrates the strong orientation of the funding line towards innovation, indicating that at least the reference to multiple types of innovation has a positive effect on the selection process. In contrast, there is little evidence that references to new stakeholder groups, specifically social innovation or a dedicated combination of structural change and innovation are determinants of outline success. Furthermore, it is remarkable that significant differences between types of lead applicants exist - even when controlling for characteristics of project outlines and other characteristics of consortia - with private enterprises in particular performing considerably weaker compared to R&D institutions.

5 Conclusion

The preceding chapters have emphasized various new elements of the '*Innovation & Strukturwandel*' programme family such as a broad understanding of innovation or the opening to new actors. These elements are rooted in the rationale of innovation in a comprehensive understanding, i.e., as new solutions to existing challenges, being an important condition for structural change in regions. This rationale explains the broadening of innovation from a merely technological viewpoint to an approach that encompasses new organisational aspects, new forms of collaborating, involving actors that previously were not mainly active in innovation etc. However, relating structural change to research and innovation is a rather new phenomenon, as chapter 2 has pointed out. Given that structural change affects a country's entire socio-economic system, transformative steps towards a sustainable and resilient future are currently needed. These massive changes need to include new, innovative approaches, which explains the underlying rationale of the '*Innovation & Strukturwandel*' programme family.

Designing new policy programmes with new rationales and objectives not only requires new responses on the side of the project outlines, but also new approaches in preparing the outlines as well as identifying the most promising ideas which are selected for funding in the next round. The selection of successful outlines was based on the outline concepts, presentations of the project coordinators in front of a jury and the final decision taken by the funding body. In this context, this paper exclusively refers to the analysis of project outlines as an empirical basis. However, since the project team conducted a series of interviews with project coordinators and regional actors in selected case examples, the authors gained additional information which allows to validate the findings.

Concerning project ideas developed in the outlines, the text analyses have shown a broad portfolio of innovation approaches (see table 5). However, a considerable share of outlines did not explicitly refer to innovation as such. It can be assumed that these outlines refer to the development and/ or implementation of new, transformative approaches which are rarely perceived as "innovation". This might be due to the territorial approach and inclusion of a high number of actors, while "innovation" could be rather perceived on the level of private companies.

In general, it has been shown that "innovation" is very often related to economic aspects, followed by technological and process innovation. This follows the rather predominant understanding of innovation. However, as shown above, the spectrum of innovation types mentioned in project outlines is impressive, showing indications of a broad understanding of innovation, as intended by the call documents. This finding is further emphasised by the fact that nearly half of all outlines (46.4%) refer to more than one innovation type. This can be considered as first indication towards the adoption of new goals of the funding guidelines.

Concerning new actors, specifically in the role of applicants, the analysis shows the high dominance of research organisations, and public and private intermediaries. This finding is not surprising since the programme addresses research and innovation-related aspects and change processes in territorial contexts. However, the call seemed to be attractive for private businesses as well - in total, 39 (out of 235) lead applicants were enterprises. But it has to be mentioned that (1) companies might be part of the consortium in a partner role, and (2) the logit analysis has shown that outlines from private businesses were less successful than those of R&D or public and private intermediaries. As mentioned above, one of the reasons for this result might be the fact that research and intermediary organisations are very experienced in responding to (complex) calls such as the analysed programme that is embedded in the rationale of supporting research and innovation activities. Moreover, private businesses tend to have a stronger application-orientation towards commercialisation in their projects; this aspect was also raised in

some of our additional interviews. Especially in structurally weak regions, collaborative approaches between research and business partners can have positive effects for both sides and ultimately contribute to jointly addressing structural challenges of the region.

Finally, it was found that "change" is often mentioned in combination with expressions in the context "region", "economy" and "innovation", which is very much in line with the call text. Nevertheless, the relations of transformation and digitalisation on the one hand, and to demographic change on the other hand proved to be an interesting result, pointing at two key challenges in Germany as a whole, but specifically in structurally weak regions. In various interviews, infrastructure issues concerning Internet and mobile connection were mentioned, which could also be an explanation for this relation. In addition, interviews also showed that "transformation" was rather interpreted on the level of individual companies and less on a regional-systemic level. Concerning the aspect of demography, many interviews conducted in peripheral regions pointed at a pertinent obstacle for structural change: the issue of the shortage of manpower. The "market for qualified labour" is already very tight in general and particularly in some structurally weak regions. The reasons for this are the massive migration of young, qualified people since reunification to regions with favourable income prospects (mainly in western Germany) as well as demographic change as a whole.

All in all, our analysis found indications that the novel aspects were taken up in the analysed outlines, however, to a limited extent. Experienced actors on the applicant side seem to dominate the scene of successful outlines. This stands in contrast to the wish to mobilise new, unexperienced stakeholders to engage in programmes like WIR!. However, our interviews also showed that less experienced stakeholders have gained new knowledge and experience as well as new contacts through the application process and consider these aspects as highly relevant for future call processes. Moreover, the prospect of public funding for innovation projects that contribute to structural change was considered by some interviewees as an incentive to (increasingly) think about change processes. Apparently, the need for change is known by most regional stakeholders. Some interviewees emphasised the high complexity of the programme and its objectives; and the contribution of individual projects to regional structural change was discussed. It should be also mentioned that successful outlines benefit from substantial financial support, which is highly appreciated and considered as very motivating. So, '*Innovation & Strukturwandel*' (together with further funding programmes) contributes to high volumes of public funding for initiating change processes via innovation in specific fields.

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Annex 1: Overview of key search terms

Term	Definition	Term frequency	Occurrence in documents
Actor (*Akteur*)	*akteur*	2,646	228 (97.0%)
Company (*Unternehmen*)	*unternehmen*	4,066	232 (98.7%)
SMEs (*KMU*)	*KMU*, *klein* *unternehmen*, *Kleinstunternehmen*, *mittler* *Unternehmen*	1,123	168 (71.5%)
Higher Education Institution (*Hochschule, Universität*)	*hochschul* *universität*	1,517 1,009	205 (87.2%) 142 (60.4%) (both terms: 124; none: 12)
Research Institution (*Forschungseinrichtung*)	*forschungseinrichtung*	375	147 (62.6%)
Civil society (*Zivilgesellschaft*)	*zivilgesellschaft* *bürger*	225 685	73 (31.1%) 125 (53.2%)
Public administration (*öffentliche Verwaltung*)	*öffentlich* verwaltung*, *kommunal* verwaltung*, kreisverwaltung*, *gemeindeverwaltung*, *stadtverwaltung*, *regionalverwaltung*"	105	25 (10.6%)
Inexperienced in innovation (*Innovationsunerfahrene*)	*innovationsunerfahr*	17	11 (4.7%)

Annex 2: Summary statistics

Variable	mean	sd	min	max
Success of project outline	.3489362	.4776511	0	1
Length of project outline (ln)	8.592968	.2923043	6.71417	9.212937
Relative term frequency of term innovation	.0083754	.0051739	.0008398	.0310301
Reference to none/single/multiple types of innovation	1.225532	.8295988	0	2
Reference to societal innovation	.1574468	.3649989	0	1
Reference to new types of actors	.6085106	.4891252	0	1
Joint reference to structural change/innovation	.6	.4909436	0	1
Applicant type	1.753191	.7211254	1	3
Size of consortium (ln)	1.153618	.4242169	0	2.564949
Consortium with all types	.2297872	.4215939	0	1
Number of other project outlines from same county (lead applicant)Other_applicants_lead	2.378723	2.754401	0	10
Vote share AfD in Federal elections 2017	17.8986	7.109873	5.805914	35.46494

Variable	mean	sd	min	max
WIRI (First call for applications)	.4468085	.4982238	0	1
Observations	235			

Annex 3: Logit regression model

Main model results	M1
Length of project outline (ln)	2.606***
	(3.12)
Relative term frequency of term innovation (%)	3.844***
	(3.56)
Rel. term frequency of „innovat*“ x Rel. term frequency of „innovat*“	-1.309***
	(-3.02)
Reference to no specific type of innovation	-1.234**
	(-2.43)
Reference to single type of innovation	-0.797*
	(-1.88)
Reference to social innovation	-0.648
	(-1.35)
Reference to new types of actors	0.279
	(0.74)
Joint reference to structural change/innovation	0.153
	(0.43)
Applicant type: public and private intermediary	-0.435
	(-1.24)
Applicant type: private enterprise	-1.605**
	(-2.53)
Size of consortium (ln)	-0.295
	(-0.59)
Consortium with all types	0.729*
	(1.79)
Number of other project outlines from same county (lead applicant)	-0.140*
	(-1.75)
Vote share AfD in Federal elections 2017	-0.00620
	(-0.19)
WIRI (First call for applications)	-3.993***
	(-3.09)
WIRI (First call for applications) x Vote share AfD in Federal elections 2017	0.148**
	(2.50)
Observations	235
Pseudo R^2	0.263

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