Cross-Border Cooperation Concept in Multifunctional Agriculture under RIS3

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Abstract – **Multifunctional agriculture holds several potentials for applying new technologies and innovative processes to reduce its environmental impact in line with the European Green Deal. Though, new cooperation concepts are a sufficient tool to enhance these potentials, using interdisciplinary and cross-border approaches. Hence, Regional Innovation Strategies on Smart Specialization (RIS3) can play a key role on political level to foster regional innovation development on agriculture in rural areas. By analysing Smart Specialization priority areas, potential crossovers between this innovation policy and actual implementation in practice can be deduced for cross-border cooperation approaches. Thus, the conducted research offers a comparison of priorities for German regions involved into the RUBIN program as use cases, supporting rural and less developed regions. Through these introduced use cases and strategy analysis, the inductive and deductive research offers a cross-border cooperation concept for legume food production, exploiting spillover effects to other priorities related to multifunctional agriculture. The core element of the concept is the introduction of knowledge hubs with an interdisciplinary view to enhance and apply innovation potentials in line with RIS3, which create positive effects on the environmental impact from the start with legume as raw materials until an improvement of its product portfolio for consumption at the end.**

Keywords – **Case study; conceptual cooperation framework; environmental spillovers; innovation policy; legume supply chain; smart specialization; rural development**

1. INTRODUCTION

The European Green Deal is setting the scene for the green transition of European society in various fields. On core pillar of the initiatives is the Farm to Fork Strategy to support the European food system and enable a fair, healthy and environmental-friendly agricultural sector [1]. This objective is also congruent to the UN Sustainable Development Goal No. 12 [2]. However, the actual implementation of the European initiative at local or regional level is not specified. Thus, the interdependencies to the regional integration of Smart Specialization as innovation policy to identify potentials for regional innovation achievements for transformation and sustainable growth become significant to be analysed in this matter [3].

Regional Innovation Strategies on Smart Specialization (RIS3) were introduced as innovation policies by the European Commission to foster regional strength and competitiveness [4]. After expiration of the funding period 2014–2020, European regions are

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monitoring and evaluating their individual performances to adjust their strategies, set up new monitoring measures and choose aligned priorities for the new funding period 2021–2027 [5].

These European policy initiatives apply, needless to say, for rural areas as well. They are characterized strongly by agricultural economies [6], [7]. This particular sector contributes with 9 % to global Greenhouse Gas emissions in 2020, thus, agricultural activities still bear potentials for improvements on its environmental impact [8]. The aforementioned policies aim to foster innovation and technology application to capitalize on those potentials. However, the pure introduction of new technologies as promoted in past innovation policies becomes detached by new experiences of innovation application in rural areas' agriculture resulting from diversification and technology combination [9], [10]. Besides diversification, additional new trends emerged when it comes to policy design in rural areas, namely focus on entrepreneurship and innovation, relevance of multilevel governance policies and focus on local specifies [11]. These trends are identical to core aspects of the Smart Specialization approach highlighting its significance for rural development.

In this context, the concept or multifunctional agriculture was introduced as perspective to assign agriculture more functions than simple food production. Basically, two forms of multifunctional agriculture are discussed in literatures, being either a tool of agriculture policies or a concept for rural development and agricultural change [12], [13]. However, in both cases the application of Key Enabling Technologies through innovation policies such as Smart Specialization is a crucial aspect for future development. Consequently, Entrepreneurial Discovery Processes (EDPs) as one of the key concepts in Smart Specialization approaches should be put into focus for agricultural sector [14], [15]. Paradoxically, farmer-driven innovation processes – being the counterpart of EDPs in agriculture – are underrated in rural area multifunctional agriculture development [16], which identifies a research problem in this particular field that is underlined by regional policy's task to sustainably develop multifunctional agriculture for protection agriculture environment [17].

Nevertheless, cooperative approaches are necessary to apply innovative knowledge and technologies in agriculture [18], which results from insufficiency of linear transfer from research to farmers [19]. Thus, co-creation and cross-border cooperation approaches are promising concepts for innovation policy application in agricultural activities. However, for multifunctional agriculture the comprehension of co-production/co-creation to strengthen resource base and enable multifunctional agriculture misses conceptual frameworks [20]. In addition, RIS3 also lacks on sufficient cross-border concepts for research, innovation and application as driving innovation policy applicable for rural area development [21] even though cross-border cooperation is a key factor for regional competitiveness [22]. This crossover clearly postulates a research gap of missing cooperation concepts under the umbrella of RIS3 for innovation support in the particular field of multifunctional agriculture.

In this vein, audits with 21 triple helix actors involved in RIS3 development and implementation were implemented in the SMART_watch project, part-financed by INTERREG Central Europe Program 2014–2020 and revealed low cooperation measures between regions. Almost one third of the participants rejected any cross-border cooperation for RIS3 in their region. The existing cooperation were evaluated in average with middle intensity, while cooperation with neighbour regions average score tends towards low scores. Therefore, a practical gap can be concluded based on implemented audits supplementing the introduced research gap.

Following this gap, this paper will introduce a sufficient cooperation concept for multifunctional agriculture and its impacts to existing Smart Specialization Strategies of selected German regions, by analysing a use case for co-production and Key Enabling

Technology (KET) application on the specific example of legume food production. The conducted research was implemented alongside a project development for the RUBIN program of German Ministry for Education and Research aiming to foster strategic partnerships between entrepreneurs and academics to foster innovation application in less developed/rural areas in Germany [23]. The concept will introduce interaction between the different actors on cross-border level, identify potentials in transformation into multifunctional agriculture for legumes and reveal spill-overs to RIS3 implementation of the participating regions.

Setting this scene, RIS3 merges multifunctional agriculture and innovation policies in this particular field. Thus, this policy retrieves potentials for sustainable development for regional and rural regions in terms of agriculture by promoting local entrepreneurship [24], applying new KETs and innovation measures [25] and on the same track reduce emissions on this sector [3]. However, a key pillar in regional strategy design is the selection of priorities on individual basis [26]. This is a crucial decision by the regions, since the allocated and distributed funds are following directly according to the priority selection [27]. Thus, it is necessary to analyse the chosen priorities by participating regions of the program in advance. If no relating priorities are reflected in published innovation strategy document, conclusions from a cross-border cooperation to RIS3 implementation can't be made. Also, equal priority selection in terms of RIS3 is expected to better enhance cross-border cooperation activities [28].

Consequently, to previous argumentation as well as the identified research gap, two research questions are the backbone of conducted research. Firstly, according to the specified condition for equal priority selection in RIS3 to develop a sufficient cross-border concept, the paper will analyse how selected priority areas of RIS3 are equally chosen by regional government of participating program regions. Secondly, following the identified research gap this paper examines how a cross-border cooperation concept enhancing multifunctional agriculture under RIS3 policies can be established. The concept will be based on an applied use case for legume food production in German less developed regions within the RUBIN program [29].

By answering the proposed research questions, this paper contributes both theoretically and practically to the existing research. First, theoretical contribution will be done by exploration of existing priority setting under RIS3 for a certain number of regions to identify future cooperation potentials and establishment of a cross-border cooperation approach uniting multilevel actors. Additionally, policy recommendations for future RIS3 design and implementation will be deviated from this research. Second, theoretical contribution is also provided for improvements and new insights of multifunctional agriculture resulting from a new perspective and crossover with RIS3 as political intervention. Third, practical contribution is emphasized in the cross-border cooperation concept for the use case of legumes in the RUBIN program area. The cooperation concept application in practice is already under development, thus, the conducted research has a theory-to-practice character as well. Therefore, in a sum, the conducted research contributes in both theoretical and practical ways to organizational improvements in the agricultural sector, which implicit offers potentials in reducing environmental impacts in the specified research area and a shift towards circular economy being a key objective for the European Union, which implementation process is also limited due to missing KETs [30].

This paper is structured as follows: following the introductory chapter used methods and methodology will be presented before key results of the research are offered in the chapter hereinafter. At the end of this paper, a discussion on key findings including derivative recommendations is offered including some concluding remarks and research limitations.

2. METHODS AND METHODOLOGY

The conducted research is based on inductive and deductive perceptions, though, regarding the proposed objectives of the research it can be argued to be exploratory as well. In general, exploratory research methods are based on qualitative approaches, facilitating assessment of discovering new insights and crossovers [31], especially qualitative approaches are favoured to analyse political innovation changes [32], [33]. Summarizing all implemented methods, the conducted approach can be labelled as hybrid research approach [34] as a mix of deductive and inductive perceptions for exploration.

Firstly, the research is based on implemented audits in line with the SMART watch project, part-financed by INTERREG Central Europe Program. Structured audits were conducted by the authors and implemented with practical actor as action research [35] in the field of RIS3 development and implementation from different regions. The participants are following triple helix approach representing business, academics and political level [36]. For this research, only questions on cooperation of their regions were incorporated, asking for any cooperation in general as well as their density in terms of RIS3 implementation. The scale followed scores from 1 (statement not true) to 5 (statement fully true) with the option to skip a question if no evaluation of statements is possible by the participant. This yielded primary data initiated further research in the particular field of cross-border cooperation in RIS3 as a first step of the final research process.

Secondly, from a deductive perspective the research builds up on RIS3 strategy documents with focus on the selection of priority axis. Thus, the S3 Platform as main Smart Specialization database hosted by the Joint Research Centre was used as core database to retrieve necessary secondary data for research purposes [37]. Due to the research boundaries stipulated through the RUBIN program area [29], case study methods are serving as research method [38] in combination with thematic and content analysis methods [39], [40].

Thirdly, the mainly driving research impulse is the construction of knowledge by using methodological actor's approach. Hence, reality and facts are created independently of affected observers – individuals. Thus, knowledge is constructed by an amount of denotations shared by a larger number of people [41]. Therefore, understanding of experienced, observed and analysed reality as an interdisciplinary and social construct is the driving impulse of the present research, including business and management, innovation policies, policy making, multifunctional agriculture and co-creation concepts. In this, the research develops a conceptual approach and model breaking boundaries of single disciplines and domains emphasizing synergetic insights with potentials to contribute to existing global environmental changes at the very end.

The presented methods were expanded by deep literature review and desk research on latest findings and related articles in the particular field. The postulated research questions have been basis for further research method implementation with the researcher's aim to increase the quality of results by mentioned combination of different disciplines and concepts. Fig. 1 illustrates the research path undertaken.
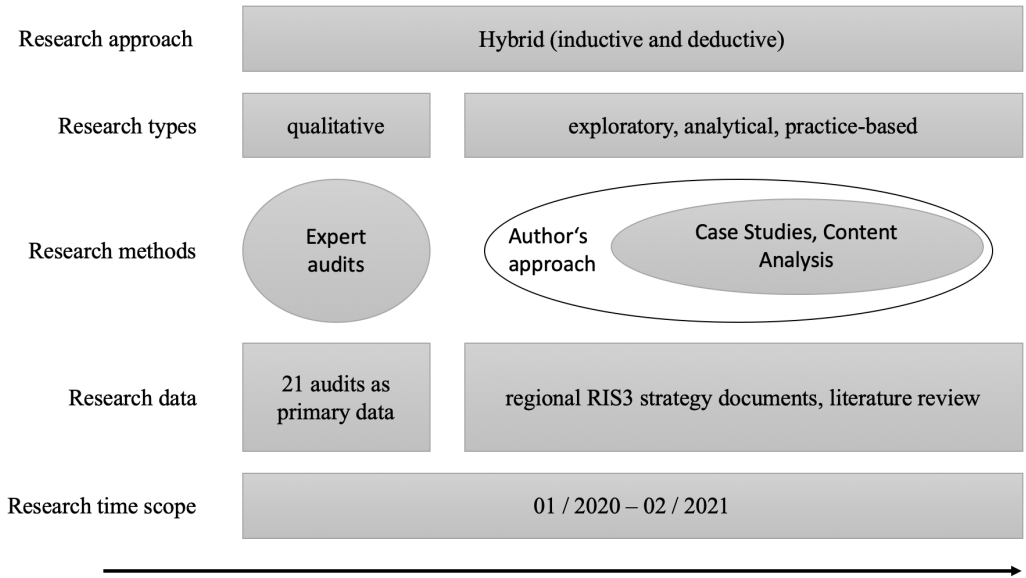
Fig. 1. Research methodology (compiled by authors).

Hence, the hybrid research and its results are also based on constructivism and interpretivist of the researchers [42], [43]. Both philosophical perspectives are the background of the following chapter and the provided insights to set up a sufficient cross-border cooperation concept under the umbrella of RIS3 as innovation policy using the particular use case of legume food production as potential multifunctional agriculture phenomena in the German RUBIN program.

3. RESULTS

In the following subsections the results of introduced research methods are presented. First, a comparison matrix is provided for the selected priorities of affected German regions in the present use case for multifunctional agriculture co-creation through cooperation. And second, the actual cooperation concept framework illustrates the interactions between actors on a cross-border basis and how they affect RIS3 as well as enhances potentials for multifunctional agriculture, using the use case for legume food production.

3.1. RIS3 priority selection comparison of participating regions

Reviewing the German regions being able to join the RUBIN program for rural development reveals a strong trend to former German Democratic Republic (GDR) regions, since they are claimed to be less developed which is the backbone of this national development program [44]. Besides all former GDR regions and parts of Berlin, the majority of Federal States of Lower Saxony and Schleswig-Holstein are indicated to be less developed in terms of their economies. Thus, both states have been incorporated to this research analysis with their respective Smart Specialization Strategy documents. In contrast, for Bavaria, Hesse, North Rhine-Westphalia and Rhineland-Palatinate only a few regions have been identified as less developed. Thus, those Federal States were not included to the analysis.

Furthermore, the state of Saarland as a whole was typed as less developed, but no regional Smart Specialization Strategy exists [37] hence this region was excluded from the analysis.

Following this containment of regions based on the RUBIN program formalities, a comparison of selected RIS3 priorities between the regions was implemented. Even though, the regions choose their priorities on individual basis, a lot of common priorities have been identified, which might enhance close cooperation initiatives for innovation applications in the particular field. As indicated earlier, the research was aligned with a use case for multifunctional agriculture using an example of legume food production. Thus, priorities concerning Nutrition, Agriculture, Health and Life Sciences, Manufacturing, Circular Economy, Medicine as well as social industries were in the focus of the research since they are affected areas of multifunctional agriculture [45]–[48].

Table 1 illustrates the results of conducted comparison in three regions being able to utilize from the National RUBIN program, namely Berlin/Brandenburg, Lower Saxony and Mecklenburg Western-Pomerania.

TABLE 1. RIS3 PRIORITY COMPARISON OF BERLIN/BRANDENBURG, LOWER SAXONY AND MECKLENBURG WESTERN POMERANIA

Regions	Berlin / Brandenburg	Lower Saxony	Mecklenburg Western-Pomerania
Berlin / Brandenburg		Healthcare; Transport, mobility and logistics; Power engineering; ICT	ICT; Healthcare; Transport, Mobility and Logistics
Lower Saxony	Health and social industry; Mobility economy; Energy industry; Digital and creative economy		Mobility economy; Health and social industry; Agriculture and food industry; Energy industry; Digital and creative economy; New materials and manufacturing
Mecklenburg Western-Pomerania	ICT; Health and life sciences; Mobility	Mobility; Health and life sciences; Nutrition; Energy and climate; ICT; Sustainable production techniques [...]	
Saxony	ICT and digital communication; New materials	ICT and digital communication; New materials	ICT and digital communication; Advanced production technologies
Saxony-Anhalt	Resource efficiency and circular economy; Mobility and logistics; Health and medicine; Renewable energy and sustainable energy production	Health and medicine; Renewable energy and sustainable energy production; Plant and machine engineering	Mobility and logistics; Renewable energy and sustainable energy; Health and medicine; Mobility and logistics; Smart production and industry 4.0
Schleswig Holstein	ICT and media; Life Sciences; Renewable Energies	Maritime economy; Life sciences; Nutrition industry; ICT and media; Renewable energies	Renewable energies; Life sciences; ICT and media; Nutrition industry
Thuringia	Healthy Life and health industries; ICT and innovative services close to production; Sustainable energy and resource use; Industrial production and systems	Healthy life and health industry; ICT and innovative services; Sustainable and smart mobility and logistics; Sustainable energy and resource use; Industrial production and systems	Sustainable energy and resource use; Healthy life and health industry; ICT and innovative services [...]; Industrial production and systems

Source: compiled by authors.

Each cell is providing a list of chosen priorities being identical between the two regions in the first column and table heading. However, the labelling is chosen from the official

documents of the region in the first column. Thus, another crucial aspect for RIS3 can be emphasized: even though the content of priorities is strongly overlapping, the regions are choosing different labels for their priorities. Also, the research revealed that mixture of priorities is offered by some regions, while others are using a clearer differentiation between related areas, e.g. 'ICT' vs. 'ICT and media' vs. 'ICT and innovative services close to production'. Hence, the analysis offers the respective denotations of all analysed regions in the following illustration. Despite Berlin and Brandenburg are two separated Federal States, both states are developing and implementing a joint strategy for Smart Specialization [49].

As aforementioned, the focus of conducted research are cooperation potentials on multifunctional agriculture, thus, the listed priorities affecting it are highlighted in Table 1 by being written in cursive letters. It is obvious that all three analysed regions provide potentials for cross-border cooperation initiatives with all other program regions under the umbrella innovation policy RIS3. Reviewing the listed priorities, ICT related priorities appear in highest amount, confirming the trend towards digital transformation in regional development [50]. In addition, at least two priorities under RIS3 are identical for each combination of the listed regions. Hence, cooperation potentials are not limited to one particular sector of interest. Therefore, this analysis opens up further research approaches on collaboration in other sectors as well.

The same procedure applies for Table 2, offering the comparison against all program regions for the four remaining regions of Saxony, Saxony-Anhalt, Schleswig-Holstein and Thuringia. Again, ICT related priorities have the highest amount of consensus between the regions. Also, for each combination of the four illustrated regions with all other program regions, at least one match in RIS3 priorities can be identified.

As both tables illustrate, for each combination of regions, identical priorities have been identified. Thus, all regions own large potential to enable cross-border cooperation for innovation initiatives alongside their RIS3 development and implementation.

Additionally, with the exception of Saxony, all regions have common priorities in the frame of multifunctional agriculture, which, again, enables cross-border cooperation option in this particular field. Additionally, on the one had side it might be quite obvious that regions with rural areas are focusing on agricultural specialization [51], [52], but on the other hand side the analysis demonstrates the innovation policy support and legislation behind as well.

TABLE 2. RIS3 PRIORITY COMPARISON OF SAXONY, SAXONY-ANHALT, SCHLESWIG-HOLSTEIN AND THURINGIA

Regions	Saxony	Saxony-Anhalt	Schleswig-Holstein	Thuringia
Berlin / Brandenburg	ICT; Materials	ICT and innovative services close to production; Industrial production and systems	ICT; Healthcare; Power engineering	Healthcare; ICT; Clean technologies; Production and automation technology
Lower Saxony	Digital and creative economy; New materials and manufacturing	Health and social industry; Energy industry; New materials and manufacturing	Maritime economy; Health and social industry; Agriculture and food industry; Digital and creative economy; Energy industry	Health and social industry; Digital and creative economy; Mobility; Energy industry; New materials and manufacturing
Mecklenburg Western-Pomerania	ICT; Sustainable production techniques [...]	Mobility; Energy and climate; Health and life sciences; Mobility; Sustainable Production techniques [...]	Energy and climate; Health and life sciences; ICT; Nutrition	Energy and climate; Health and life sciences; ICT; Mobility; Sustainable production techniques [...]

Saxony		Advanced production technologies	ICT and digital communication	ICT and digital communication; New materials
Saxony-Anhalt	Efficient and intelligent manufacturing techniques		Renewable energy and sustainable energy production; Health and medicine	Renewable energy and sustainable energy production; Health and medicine; Mobility and logistics; Plant and machine engineering
Schleswig Holstein	ICT and media	Renewable energy and sustainable energy production; Life sciences		ICT and media; Renewable energies; Life sciences
Thuringia	ICT and innovative services close to production; Industrial production and systems	Sustainable energy and resource use; Healthy life and health industry; Sustainable and smart mobility and logistics; Industrial production and systems	ICT and innovative services close to production; Sustainable energy and resource use; Healthy life and health industry	

Source: compiled by authors

3.2. *Cross-border cooperation concept for multifunctional agriculture under RIS3*

In the following subchapter, the cross-border cooperation concept will be illustrated, using a case for legume food production in the frame of the German RUBIN program. Based on the gained insights from previous chapter, cooperation initiatives based on identical priorities are available for all regions. However, business innovation potentials can be utilized more effective in interdisciplinary approaches [53], [54]. In addition, RIS3 implementation introduces complex multi-level actor involvement as well [55], [56]. Though, innovation was regarded as emerging in businesses only, multi-level actors became crucial in innovation processes and enabled combination of internal and external knowledge [57], [58], approaches to include actors from various spatial fields [59] and focus on local available capabilities and knowledge [60], [61]. Therefore, a cross-border approach on cooperation incorporating actors as knowledge hubs from different disciplines is set up to identify potentials for improvements on multifunctional agriculture for regional food production of legumes. Knowledge hubs can be understood as institution incorporating different knowledge and interests with the overall objective to transfer knowledge but on the same track exchange knowledge between academics, local businesses and politics [62], [63].

According to this argumentation, the cross-border cooperation concept is illustrated in Fig. 2 with three involved regions using a use case for regional legume food production, which is also the available raw material crafted locally. In this concept, region B is represented by the local agricultural business with the 'usual' food production using the raw material legumes including the manufacturing process (Agricultural reactor) and supply on the market. Based on the cross-border cooperation idea, two different knowledge hubs, specialized in line with the priorities of the regions they are representing, are incorporated to the legume production supply chain.
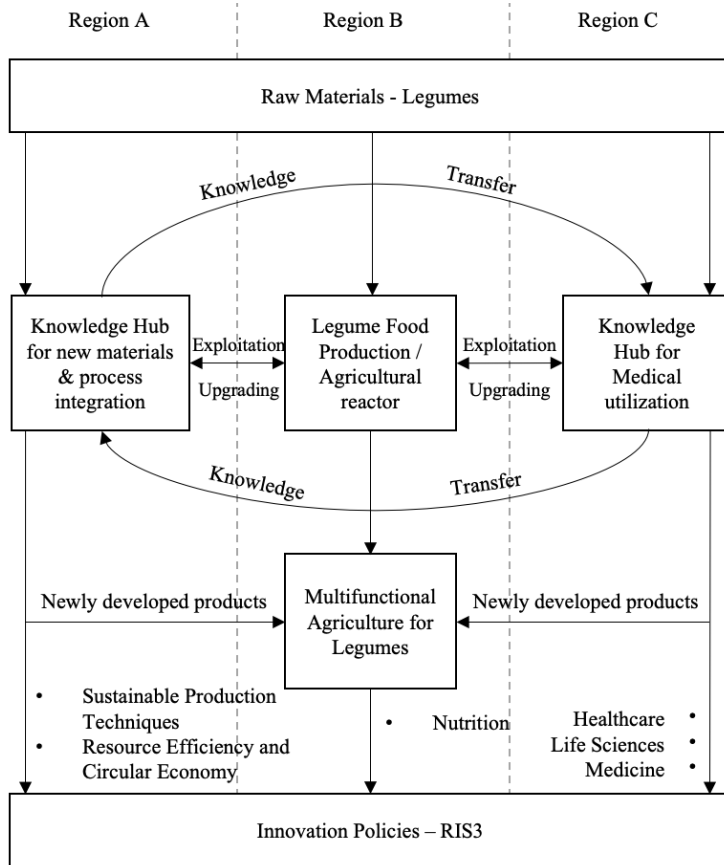
Fig. 2. Cross-border cooperation concept as use case for legume multifunctional agriculture and impacts on RIS3 (compiled by authors).

In this concept, the knowledge hubs have three main functionalities:

1. Exploiting insights from the actual production process with the objective to improve and upgrade the process developing and applying KETs and innovation in close cooperation with the producer in region B.
2. Sharing knowledge with other incorporated knowledge hubs as this is considered to be a crucial aspect in successful innovation and technological development [64], but in close cooperation with the business as well to meet actual market needs [65].
3. Contributing to improvements for multifunctional agriculture by utilization of gained knowledge and increasing the available product (service) portfolio of the raw material – here: legumes.

In this particular use case, both knowledge hubs are exploring innovative manufacturing technologies based on biophonic to upgrade legume ingredients for potential exploitation in the whole supply chain and utilization as pharmaceutical material. Arising synergetic effects will enable and support low emission and local production of a larger product portfolio.

As mentioned in the previous chapter, this cross-border cooperation concept does not only hold potentials for innovation and KETs application in the field of multifunctional agriculture, but also fosters the implementation of regional Smart Specialization approaches.

This is the final step illustrated in Fig. 2 showing positive contribution to specific priority areas of RIS3 from the full progress.

As mentioned in the introduction, by application of the concept in practice, several potentials for reducing environmental impact in the particular use case can be emphasized, e.g. enhancing the potential for usage of the locally crafted raw material legumes, lowering the demand for import products in food and health sector as well as a shift towards more circular economy as a key objective of the European Union in the frame of the Green Deal [66].

4. DISCUSSION AND CONCLUSION

The conducted research aimed to analyse two core research aspects of RIS3 priority setting as starting point for cooperation and cross-border cooperation concepts. Both aspects were exploited with a use case for multifunctional agriculture in legume food production in the RUBIN program area. In the frame of multifunctional agriculture case study analysis are quite common and accepted in existing literatures [45], [67]–[69]. However, additionally to the presented results some practical recommendations can be made by the authors for future sustainable implementation.

Theorem 1. Currently, European regions are revising their Smart Specialization strategy documents for the new funding period 2021–2027 [5]. Thus, it is crucial to learn from previous period and adapt lessons learned and best practices. As mentioned in 3.1, RIS3 priorities are covering each other strongly in their subjects but still have slight differences in detailed description as well as labelling. However, as identification can be a crucial starting point for cross-border cooperation under RIS3, it is highly recommended by the authors to unify the priorities to a certain degree to make policy application easier for involved actors. This recommendation was already made by main author [70] and is again confirmed by yielded results of the conducted research. In this vein, the high consensus of RIS3 priorities identified in Table 1 and 2 should be a starting point for discourse on political level for future cooperation potentials among the regions. Hence, this research is contributing as well through offering a cooperation concept to improve innovativeness and economic development in rural areas [71].

Theorem 2. Cross-border cooperation enables potentials for regional diversification – in the analysed case towards multifunctional agriculture – and therefore enables innovation potentials in different areas. This is also in line with existing literature of cooperation improvements in the field of Smart Specialization [72].

Theorem 3. Cross-border cooperation should include knowledge hubs on an interdisciplinary approach to seek for innovation and KETs application in existing agricultural processes. Integrating sufficient knowledge transfer between the hubs and consideration of business sector offers further innovation potentials for existing systems [64], [65].

Another aspect indicated at the end of chapter 3 are spillover effects resulting from the implementation of the cross-border cooperation concept for the use case of multifunctional agriculture using legume food production. Even though such spillovers were not part of the conducted research, they can be emphasized implicitly from it.

1. The concept is supporting an improvement in utilization of locally produced raw materials. Increasing the degree of efficiency of this raw material has positive effects on imports and transport sector by reducing its demand in agricultural sector. This is not only pushing circular economy application and autarkic production forward, but also holds potentials in

reducing environmental impact [73].

2. Contributing to RIS3 positively can improve regions' performance sustainably. As allocated funds to the regions also depend on their performances alongside Smart Specialization priorities and performances, it might be reasonable to alleviate future access to funds for other innovation driven processes in agricultural field.

3. The cross-border cooperation concept is seen as enabler and developer for innovation and KETs application. Thus, best practices and lessons learned can be generated on innovation demonstration level. It is crucial to focus on innovation application on demonstration level to achieve the published environmental targets for 2050 [74].

Hence, the research faces limitations. The practical application of the cross-border cooperation concept needs to be proven. Even though, the cooperation concept is on development in practice, its efficiency and positive effects have to be elaborated in a later stage or in other words, the theory to practice adaptation is not proven yet. In addition, the logical crossover between the cooperation concept for multifunctional agriculture and impacts on RIS3 might not be a core aspect for affected actors in practice [75], especially for businesses. Nevertheless, the positive spillovers can appear anyways.

In a sum, the conducted research tackled two proposed research questions. At first, a comparison of selected priority axis under RIS3 implementation for the RUBIN program regions was illustrated. Herewith, several common priorities were identified as basis for potentials on cross-border cooperation for RIS3 with focus on multifunctional agriculture being employed as use case of legume food production. Second, a cross-border cooperation concept was deviated for this use case in multifunctional agriculture including interdependencies with RIS3 implementation. The core of conducted concept is the integration of specialized knowledge hubs to exploit potentials on usage of the raw material legume and its spillovers to other priority areas of RIS3 as well as opportunities for reduction of the environmental impact resulting from this particular agricultural field.

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