SUSTAINABLE STORAGE OF GRAINS
BY IMPLEMENTING A NOVEL PROTECTANT
AND A VERSATILE APPLICATION TECHNOLOGY

D4.12 Report of SWOT

novIGRain

Report of SWOT	
Lead beneficiary:	**United Experts**
Main authors:	**Egor Moshkin (United Experts)**
Issued Date:	**30/04/2026**
Due date:	**30/04/2026**

Version	Date	Contributors	Reviewers
1	**30/04/2026**	**Egor Moshkin**	**Frederic Verwilghen**

Dissemination Level	
X	**PU = Public**
	PP = Restricted to other programme participants (including the EC)
	RE = Restricted to a group specified by the consortium (including the EC)
	CO = Confidential, only for members of the consortium (including the EC)

This project has received funding from the European Union's Horizon 2020 research and innovation programme, under grant agreement No 101000663.

Contents

1. Introduction 3
2. Methodology and Inputs 4
2.1. Methodology 4
2.2. NovIGRain Impact Assessment Work Package 4
2.2.1. Reference Scenarios 4
2.2.2. Market Studies 5
2.2.3. Co-creation Workshops 5
2.2.4. Environmental Life Cycle Assessment 6
2.2.5. Social Life Cycle Assessment 7
2.2.6. Economic Impact 7
2.2.7. Potential Business Models 8
2.2.8. Legal Framework Analysis 8
3. SWOT Matrix 10
4. TOWS Matrix 12
5. References 13

1. Introduction

The European grain storage sector has expanded considerably in physical capacity for cereals, oilseeds, and protein crops in recent years. However, increased capacity alone has not resolved persistent vulnerabilities in the grain supply chain. Many regions still face the risk of storage bottlenecks during years with unexpected logistical disruptions, and the strategic focus is increasingly shifting from volume to quality, specifically the ability to prevent post-harvest losses and preserve the safety and marketability of stored grain throughout the supply chain.

Losses during storage are frequently driven by pest infestations, mould development, and sub optimal handling practices, which together contribute to reduced grain volumes, downgraded quality classifications, and in some cases non-compliance with food and feed safety standards. These risks are compounded by a growing dependency on a narrow and shrinking set of pest control solutions. As EU regulations continue to phase out many widely used chemical treatments and as resistance to remaining active substances increases, storage operators across farms, cooperatives, and commercial facilities are left with a progressively limited toolbox for grain protection.

Conventional treatment strategies, including contact liquid insecticides such as deltamethrin and phosphine fumigation, face increasing regulatory pressure, pest resistance development, occupational safety concerns, and residue requirements. Most represent single mode interventions that are not adapted to the diverse and evolving needs of modern grain storage operations. Against this background, there is a clear and urgent need for innovative grain protection approaches that are not only technically effective but also environmentally sound, socially acceptable, economically viable, and operationally practical across a broad range of storage contexts.

The NovIGRain project addresses this need by developing and validating innovative technologies for stored grain protection, with a primary focus on a novel ultra-low volume (ULV) insecticide based on the insect growth regulator S-methoprene and new dual application technology. Technological performance, however, is only one dimension of a successful innovation. For novel solutions to achieve meaningful adoption and long-term impact in the grain sector, they must be evaluated across environmental, social, economic, legal, and market dimensions, and matched with implementation pathways suited to real world conditions.

Impact Assessment work package of the NovIGRain project was designed for this purpose. It encompasses a set of complementary studies, including reference scenario analysis, market studies, co-creation workshops with industry stakeholders, environmental life cycle assessment, social life cycle assessment, cost benefit analysis, potential business models analysis, and a legal framework analysis.

This report presents the strategic synthesis of all work conducted within the impact assessment work package. Using the SWOT framework, the report integrates quantitative and qualitative insights from across the work package into a strategic assessment of the NovIGRain grain protection innovations.

2. Methodology and Inputs

2.1. Methodology

This report utilises a structured SWOT analysis with a subsequent TOWS matrix. SWOT (Strengths, Weaknesses, Opportunities, Threats) provides a simple framework for organising internal and external factors that affect an innovation or system. In this study, SWOT is used as a synthesis tool: it brings together evidence from environmental and social life cycle assessments, cost benefit analysis, market and legal studies, and co-creation workshops mapping the strategic implications of NovIGRain innovations.

On its own, SWOT is primarily descriptive. To provide strategic recommendations, this report utilises also a TOWS matrix, an action-oriented extension of SWOT first formalised by Weihrich (1982). TOWS works by systematically matching internal and external factors to derive four types of strategies:

- SO strategies that use strengths to exploit opportunities,
- WO strategies that reduce weaknesses while pursuing opportunities,
- ST strategies that employ strengths to counter threats, and
- WT strategies that minimise weaknesses and avoid or reduce threats.

This combined SWOT–TOWS approach is increasingly used in complex agricultural and sustainability contexts to turn multi-dimensional assessment results into concrete, evidence based strategic pathways. It is particularly suitable for NovIGRain's Impact Assessment Work Package, where quantitative and qualitative inputs need to be integrated into a coherent set of options for the implementation of the innovations.

The subsequent Section 2.2 therefore briefly summarises the main inputs generated within the NovIGRain Impact Assessment Work Package. These inputs provide the empirical basis for the SWOT description and the TOWS strategies.

2.2. NovIGRain Impact Assessment Work Package

2.2.1. Reference Scenarios

The reference scenarios report (D4.1) defines the baseline grain storage and pest management practices against which the NovIGRain innovations are assessed (Croes & Bamelis, 2021). It identifies current management systems, techniques, and products across three main European regions (France–Spain, Germany–Poland, Hungary–Romania) and three storage scales (farm level, operators silos, and port silos) using literature review, stakeholder workshops, and a questionnaire as primary data sources.

For each region–storage combination, the report specifies one business as usual reference system and two alternative techniques. At farm level this includes, for example, the common use of diatomaceous earth in Germany, liquid insecticides in France, and cleaning only in Hungary, while at operator and port silo level phosphine fumigation and liquid insecticides based on deltamethrin or pirimiphos methyl dominate practice. New and emerging alternatives such as cooled aeration, heat treatment, inert mineral powders, controlled atmospheres, biological control, and early warning or sensor-based monitoring systems are also characterised, including their technical advantages, limitations, and current level of uptake.

2.2.2. Market Studies

The market studies (D4.2 and D4.3) provide a quantitative and qualitative description of the stored grain sector in six European countries (France, Germany, Spain, Italy, Hungary, Romania), focusing on production volumes, storage structures, logistics, pest pressures, current control practices, and potential users of new solutions (Izinovations et al., 2024; Szilagyi et al., 2021). For each country, they describe cereal production and storage capacity, the distribution of storage across farm, cooperative, trading and port facilities, typical circulation times in storage, and the main invasive insect species affecting wheat, barley, maize, oats and rice.

The reports map existing insecticide, fumigation and powder formulations used for post-harvest protection, identify authorised active substances and emerging alternatives, and list candidate user organisations (cooperatives, traders, large silo operators, port terminals) that could adopt the new larvicide and the application technology. They also highlight regulatory and logistical boundary conditions, including differences between exporter and importer countries, reliance on long distance rail and inland waterway corridors, and the way storage capacity and transport bottlenecks shape treatment practices.

In NovIGRain Impact Assessment Work Package, the market studies provide the factual basis on how the stored grain sector in the analysed countries operates. They compile otherwise scattered information on production, storage structures, logistics, authorised products, and key actors, which is then used as input for life cycle assessments, cost benefit analysis, business modelling. By providing a consistent cross-country picture of current practice, the market studies ensure that the NovIGRain impact assessment is grounded in real market conditions.

2.2.3. Co-creation Workshops

The co-creation workshops (reports: D4.4, D4.5, D4.6 and D4.13) provided structured opportunities to involve practitioners, industry representatives, and other stakeholders from France, Germany, Hungary and wider European networks in the development of the NovIGRain innovations. Across several rounds between 2021 and 2025, the workshops served different purposes: early sessions focused on validating reference scenarios and identifying relevant alternative technologies; later sessions explored user perceptions of the S methoprene ULV product and application technology, and gathered feedback on longer term challenges, priorities, and potential business models.

The workshops combined presentations with interactive exercises, including word clouds, simple positioning matrices and structured agree disagree questions, to elicit what users value in grain protection (for example efficacy, ease of use, safety and cost), how they perceive current solutions such as phosphine and deltamethrin, and how they view the new larvicide in terms of attractiveness and fit into existing practice. Later sessions, including those organised around IPSP 2024 and ABIM 2025, broadened the discussion to regulatory barriers, resistance concerns, expectations regarding technical support, and reactions to different business model options for the new insecticide.

For NovIGRain Impact Assessment Work Package, the co-creation workshops provide the qualitative aspects of the analysis. They help identify which technical and regulatory issues are experienced as most pressing, which features of the NovIGRain innovations are

perceived as strengths or weaknesses from a user perspective, how different user groups view opportunities and threats in grain protection, and which implementation pathways seem credible or problematic in practice. These stakeholder insights complement the more quantitative insights from the studies in the work package.

2.2.4. Environmental Life Cycle Assessment

The environmental life cycle assessment (D4.7) examines the environmental impact of grain storage protection strategies, in particular the Methograin IGR 30 ULV and its (dual) application technology (with an adulticide) compared to conventional phosphine fumigation and liquid insecticide applications (deltamethrin and pirimiphos-methyl based) currently applied in the EU. The cradle-to-gate analysis quantifies the environmental burdens of grain along the supply chain, including cultivation, transport, default storage operations and final treatment, accounting for all necessary resources and emissions. The associated impact is expressed as overall single score and its relevant impact categories (human and ecotoxicity, climate change, acidification, etc.) per functional unit of 1 tonne marketable food grade grain. Aside from quantitative losses, also qualitative losses due to partly downgraded grain are accounted for through economic allocation based on probabilities of protection failure and the respective economic values. The LCA combines foreground data for larvicide production and application technology with background data from LCA database ecoinvent regarding inputs and impacts of grain cultivation, transport, default storage operations and the conventional grain treatments.

The analysis shows that grain cultivation dominates the overall impact of the supply chain by +/-98%, followed by transport with 1.8%, and default storage operations with 0.33%. The specific grain treatments, including the Plant Protection Product (PPP) production, application and emissions, remain between 0.02 and 0.13% of the overall impact depending on the choice of active substance. While phosphine has a relatively high human toxicity potential, deltamethrin and pirimiphos-methyl insecticides contribute to freshwater ecotoxicity. In contrast, the methroprene based IGR has limited toxicity yet higher impacts related to manufacturing. Hotspot and sensitivity analyses indicate that small reductions of grain losses between 0.2 and 1.3% already offset the extra impact due to the treatment. Moreover, when comparing the (no) treatment strategies, the dual application tends to have the highest impact reduction overall from 0.2% up to an order of 20% under the worst conditions of high failure probability, high value degradation and high quantitative losses, highlighting the importance of avoiding storage losses, which are expected to be the lowest for the dual application strategy on the long term.

Within the NovIGRain Impact Assessment Work Package, the LCA adds an environmental sustainability dimension to the analysis by quantifying where the impact is caused along the supply chain and to what extent potential impact reductions could be achieved depending on the treatment strategy. It does show the relative limited impact contribution of the grain treatment as such along the supply chain, yet amongst all strategies, the dual application potentially reduces the overall impact the most, given the respective expected extent of mainly qualitative losses. This perspective complements the social LCA and cost benefit assessment work in other deliverables and contributes to decision making regarding the novIGRain development and

implementation accounting for the overall environmental impact given the considered system boundaries and performance.

2.2.5. Social Life Cycle Assessment

The social life cycle assessment (D4.8) examines how Methograin IGR 30 ULV and its application technology affect social risks along the grain supply chain in France, Germany and Hungary, using 1 tonne of grain dispatched to the final customer as the functional unit. It applies the PSILCA v3.1.1 database in openLCA across four stakeholder groups (Workers, Local Community, Society and Value Chain Actors), combines detailed foreground data for the insecticide and application technology with background MRIO data for grain production, storage and transport, and expresses results in medium-risk hours.

The analysis shows that most social risks are concentrated in upstream grain production, followed by transport, while the combined contribution of Methograin IGR 30 ULV production, distribution and application technology remains below 2% of total social impacts in all three country scenarios. Sensitivity and hotspot analyses further indicate that modest reductions in grain losses (on the order of 0.4–2% of throughput) are sufficient to compensate the additional social risk introduced by the new product, and that country-specific issues such as working conditions in agriculture, transport related risks, migration flows and governance shape the overall risk profile more than the insecticide itself.

Within NovIGRain Impact Assessment Work Package, the social LCA adds a social sustainability dimension to the analysis by quantifying where social risks actually arise along the grain supply chain. It shows that farm level production and storage practices, together with transport structures and country specific labour and governance conditions, dominate the social risk profile, while the incremental contribution of Methograin IGR 30 ULV and its application technology remains relatively small and can be offset by small reductions in grain losses. This perspective complements the environmental, economic, legal and market-oriented work in other deliverables and helps ensure that decisions around novIGRain development and deployment explicitly account for social performance alongside technical and regulatory considerations.

2.2.6. Economic Impact

The economic impact assessment (D4.9) examines the cost-effectiveness of grain storage protection strategies across France, Germany, and Hungary at three scales of storage operation (Port, Trader, and Farm), using one tonne of stored grain as the unit of analysis. It applies a cost-benefit analysis (CBA) framework built around four interconnected indicators: Cost of Protection, Failure Cost, Expected Avoided Loss, and Net Benefit complemented by a Minimum Viable Grain Loss Reduction parameter to address quantitative loss uncertainty. The analysis draws on NovIGRain project deliverables, stakeholder interviews, co-creation workshops, and published literature to compare conventional EU-authorised treatments (phosphine fumigation, deltamethrin- and pirimiphos-methyl-based liquid insecticides) against non-EU reference products (Conserve Plus, Diacon IGR) and the Methograin IGR 30 ULV prototype.

The analysis shows that economic performance is shaped by storage duration, fumigation cost assumptions, and the value of the grain quality premium rather than by the choice of any single active substance. At port level, where storage is short-term, most treatments yield a

positive net benefit and liquid insecticides such as Pirigrain SLD and K-Obiol ULV6 deliver the highest net benefit due to their low protection costs. At trader and farm levels, where grain is held for extended periods, combined adulticide–larvicide strategies consistently outperform single treatments by maintaining low failure probability over time. Fumigation is economically competitive only in Hungary, where its cost is substantially lower, while in France and Germany its high cost renders it less attractive or even inferior to untreated scenarios.

Within the NovIGRain Impact Assessment Work Package, the CBA adds an economic dimension to the analysis by quantifying where value is created or lost along the grain storage chain and under what conditions the new larvicide becomes cost competitive. It demonstrates that the economic case for a larvicide is strongest where storage duration is long and where failure costs are high. This perspective complements the environmental, social, legal work in other deliverables and helps ensure that decisions around novIGRain development and commercial positioning are grounded in realistic performance thresholds and regional cost structures.

2.2.7. Potential Business Models

The business models report (D4.10) develops and evaluates a set of seven alternative pathways for bringing the new larvicide and its application technology to market, reflecting different combinations of target users, channels, and value delivery formats. It draws on the practical experience of NovIGRain partners across insecticide production, application technology, grain trading, resistance research, and regulation, and uses a structured expert-based evaluation framework with five criteria value proposition, feasibility, scalability, innovativeness, and strategic fit to industry needs.

The resulting set of business models ranges from more conventional models, such as bulk business to business sales with bundled services for large storage operators, direct supply to pest control companies, and online or retail access for smaller users, to more innovative approaches like dual use application platforms that pair the larvicide with existing adulticides, on demand leasing of ULV equipment, lab based diagnosis and customised treatment recommendations, and certification schemes for IGR treated grain. Experts from the consortium and the wider biocontrol community assessed these options in two rounds, with the most consistently promising models for near term implementation being those that build on existing professional channels and familiar application routines, while more complex system level concepts were seen as longer term or niche opportunities.

In the NovIGRain Impact Assessment Work Package, highlights which commercial configurations can amplify the strengths of the NovIGRain innovations, where feasibility or scalability constraints create weaknesses or threats, and which routes offer opportunities to align the new product and technology with current buying patterns, service structures and expectations in the grain protection sector.

2.2.8. Legal Framework Analysis

The legal framework analysis (D4.11) identifies the main European and international regulatory requirements that apply to the new larvicide and its application technology and examines how they condition the feasibility and deployment of the new grain protection product (Verwilghen, 2022). It focuses on the classification of the new formulation as a plant protection product under Regulation EC 1107/2009, the associated requirements on efficacy,

human and environmental safety, and maximum residue levels, as well as horizontal chemical legislation such as REACH and CLP, Seveso and ADR rules for storage and transport, and norms for explosion safe equipment used in grain silos.

The report also considers how these rules interact with grain storage and trade practices, including hygiene guides, packaging and waste handling obligations, and acceptance conditions in export markets, highlighting that compliance must be ensured not only for the active substance and formulation, but also for the ULV machinery and operational use at storage sites. Within the NovIGRain Impact Assessment Work Package, the legal framework analysis primarily outlines regulatory barriers, approval timelines, and operational constraints for the new product and at the same time it identifies how potential aspects of the new larvicide and the design of the application technology such as aspects the toxicological and environmental profile can be advantageous in the context of EU safety and sustainability objectives.

3. SWOT Matrix

Table 1. Summary of Strengths, Weaknesses, Opportunities and Threats

Strengths (S) *Internal positive factors*	**Weaknesses (W)** *Internal negative factors*
- **S1: Low pest resistance to S-methoprene:** Resistance studies and literature research confirm that the lack of S-methoprene usage for stored grain protection in Europe leads to low resistance to the active substance - **S2: Low social and environmental impact:** LCA studies show relatively low potential environmental and social impact of new larvicide and especially low potential impact of the application technology - **S3: Stakeholders recognise strategic value of larvicide:** Co-creation workshops and business models' study confirm that the industry is aware of the upcoming challenges and welcomes the new solutions that can deliver reliable grain protection - **S4: Dual application possibility:** Precise application of adulticide and larvicide allows for the cost efficient and effective stored grain protection strategies, which in in several analysed cases present the best economic performance - **S5: Favourable toxicological profile:** Toxicological studies confirmed the low toxicity and safety for the operators, providing more flexibility how the product can be handled by users as well as marketed via broader range of business models	- **W1: No effect of adult pest population:** Due to the nature of larvicide, the product cannot be used to deal with adult population of insects, requiring certainty that no adult insects presents or the use of adulticide, which for short term storage cases may cost more than the benefits of dual application - **W2: Requires mindset change from curative to preventive:** Larvicide products require preventive approach to grain protection, which is different approach to currently popular curative mindset of the storage operators, the required switch may be more difficult than a simple choice of the new product, preventive habits need time to be formed - **W3: Requires ULV machinery:** The new larvicide is a ULV formulation which requires specific application technology which for certain markets are not common and investment from the industry will be needed to benefit from the new product - **W4: Currently application only in silos:** In certain markets a significant share of storages is flat and by default the application technology is designed for silos, adjustments and testing may be needed to ensure that the same technology can be applied during loading of the flat storages - **W5: Low incentive to use for short-term stored grain:** Cost-Benefit analysis indicated that the most benefits from larvicide application can be realised in grain is stored for extended periods of time, therefore for short term storage the product needs to be - **W6: Need training, technical support and stewardship:** Introduction of new product with new mode of action requires trained professional both from technical standpoints ensuring that the system is correctly set up as well as sales specialists that can explain how to maximise the value from the product

Opportunities (O) *External positive factors*	**Threats (T)** *External negative factors*
- **O1: Reducing number of available active substances:** Legal analysis and market studies highlighted the continuously reducing number of available active substances and also reliance of the market on the active substance whose registration renewal may not be granted - **O2: Growing resistance to conventional treatments:** Resistance studies confirmed the presence of resistance of certain key storage species in Europe to the commonly used grain protection solutions (including fumigation and deltamethrin based products) - **O3: Market waits for new products:** Co-creation workshops and interviews with NovIGRain network of experts confirm that the users are curious to try new products for stored grain protection - **O4: Limited market access for potential competitors:** Complex regulations for new insecticide registration, long and costly process of bringing new product to the market, restrict the entrance of competing products, which creates competitive advantage for the producers that invested into registration of the product in the EU	- **T1: Low cost of fumigation in some countries:** Although in some EU countries fumigation is an extremely costly procedure that cannot be used unless extraordinary circumstance, in some countries fumigation is a cheap and widely available option making the multiple fumigations during storage period a cost-competitive alternative - **T2: Little room for new business models in grain protection:** Business model study highlighted that although industry welcomes new ideas and approaches, the practical implementation for less common approaches is difficult as there are multiple operational challenges as well as generally low margins in grain trading favour the proven formats of value delivery - **T3: Complex regulation – long time to market** Legal complexity in Europe leads to high investments needs to bring products to the market, which complicates tailoring the of the product to the particular needs of all stakeholders - **T4: Limited capacity to invest in equipment:** Although ULV equipment is very cheap if calculated per tonne of grain through its useful life cycle, still it requires upfront investment that small market players cannot afford or not willing - **T5: Market with negative perception of chemical treatments even with favourable toxicological profile:** Co-creation workshop highlighted that in certain market there is a growing interest in biological products and chemical product even with favourable sustainability profile may struggle to become popular

4. TOWS Matrix

Table 2. Strategic Recommendations from NovIGRain SWOT

	Strengths (S)	Weaknesses (W)
Opportunities (O)	**SO — Leverage Strengths to Capture Opportunities** Resistance management positioning (S1 + O1 + O2): With resistance to deltamethrin and fumigants detected, and the pool of available and effective active substances shrinking, position S-methoprene's clean resistance profile as the essential rotation partner, not just as a new product, but a regulatory and agronomic necessity. "Complete protection" value proposition (S4 + S5 + O3): The market is waiting for new solutions. Bundle the dual adulticide/larvicide application strategy with the favourable toxicological profile into a single, easy-to-adopt grain protection package that outperforms older alternatives. Early mover competitive advantage (S3 + S4 + O4): Industry already recognises the strategic value of the larvicide and competitors face regulatory barriers. Utilise dual-application value proposition to establish a dominant position before any competitor attempts to enter the market.	**WO — Overcome Weaknesses by Exploiting Opportunities** Turn the increasing resistance into a mindset-change catalyst (W2 + O2 + O3): The growing failure of curative treatments is a powerful argument for switching to preventive logic. Lead communications and training with documented resistance data to make the mindset shift feel urgent rather than optional. Assist with developing ULV infrastructure with the supply chain (W3 + W4 + O4): The competitive window gives time to co-develop affordable ULV application solutions (e.g. including flat-storage adaptors) together with equipment partners, distributors, or industry associations before the market opens up. Build stewardship as a competitive advantage (W6 + O4): Regulatory complexity keeps competitors out for years. Use that window to build a best-in-class training and technical support programme so if competitors attempt to enter the market, your network of trained operators is a structural advantage they cannot easily replicate.
Threats (T)	**ST — Use Strengths to Defend Against Threats** Total cost of ownership narrative against cheap fumigation (S4 + T1): In markets where fumigation is inexpensive, single-event cost comparisons will be unfavourable. Counter this by modelling dual-application economics over a full storage season, showing that resistance prevention and reduced fumigation frequency change the benefit to cost ratio over time. Proactive sustainability communication (S5 + T5): In markets trending toward biological products, don't wait for the chemical stigma to attach. Proactively publish and promote the toxicological and LCA data, framing S-methoprene as the responsible chemical choice. Co-create business models with trusted stakeholders (S3 + T2): Industry players already see strategic value in the product. Run structured co-creation with key grain traders and storage operators to ensure business model formats fit existing low-margin grain trading, rather than trying to impose novel formats.	**WT — Minimise Weaknesses and Avoid Threats** Segment market entry around long-term, large-scale operators (W5 + W2 + T1): Short-term storage and cheap-fumigation markets simultaneously offer the lowest benefit and the strongest competitive alternatives. Focus initial launch on large operators with extended storage periods where larvicide benefit is highest and the mindset shift is easier to justify economically. Equipment access schemes to lower the investment barrier (W3 + T4): Small operators who can't afford ULV equipment upfront are both a weak-adoption risk and a target of the limited-investment threat. In the later product stages, consider leasing, pay-per-use, or service-contract models with equipment partners to remove the capital barrier without sacrificing market reach. Phased, market-specific regulatory and product strategy (W4 + T3): market and regulatory complexities make tailoring to all markets simultaneously very costly. Prioritise geographies where flat-storage is less dominant, fumigation is restricted, then build outward systematically rather than attempting a pan-EU launch at once.

5. References

Croes, A., & Bamelis, L. (2021). *D4.1 Report on the reference scenarios and alternatives selected per region/type of storage system June 2021 novIGRain Reference Scenarios and Alternatives*.

Izinovations, Ergen, V., & Szilagyi, J. (2024). *D4.3. Market Study - Step 2 October 2024 novIGRain*.

Szilagyi, J., Rametti, L., Parquet, O., & Banse, R. (2021). *D4.2. NovIGRain Market study H2020 – step 1*.

Verwilghen, F. (2022). *D4.11. Report on the Impact of the Legal Framework novIGRain*. https://novigrain.eu/wp-content/uploads/2023/01/Deliverable-4.8-Report-on-the-legal-framework-novIGRain.pdf

Weihrich, H. (1982). The TOWS matrix—A tool for situational analysis. *Long Range Planning*, *15*(2), 54–66. https://doi.org/10.1016/0024-6301(82)90120-0