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ARTICLE

Enhancing the use of impact evaluation results: a multi-case study in agricultural research organizations

Potencializando o uso dos resultados de avaliações de impacto: estudo multicaso em organizações de pesquisa agrícola

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Abstract: Impact evaluation has historically been the primary method for assessing agricultural research. However, the practical use of its results remains underexplored in the literature. Addressing this gap, this study investigates the use of impact evaluation results in agricultural RD&I organizations through a multi-case analysis of eight organizations across three continents. Grounded in the social responsibility and ethics of research and evaluation, this study addresses the question: "How are impact evaluations in agricultural RD&I organizations conducted, and how are their results utilized to enhance strategic decision-making and innovation?" To answer this question, the AGRIUM model was developed and applied, focusing on objectives, methods, impact dimensions, uses, and stakeholders. The findings indicate that neither experience with evaluations nor the diversity of evaluated dimensions directly influence the utilization of results. Instead, three categories of factors emerged: (1) structural and organizational, such as integration into strategic planning; (2) operational, including evaluation quality, communication, and timeliness; and (3) team literacy and stakeholder pressures. Establishing a well-defined process, including information management, documentation, feedback practices, and monitoring recommendations, was identified as critical not only for driving impactful agricultural research but also for informing policy decisions and strengthening institutional strategies.

Keywords: research and development, management of technological innovation and R&D, evaluation result utilization, impact evaluation.

Resumo: A avaliação de impacto tem sido historicamente o principal método para avaliar a pesquisa agrícola. Contudo, o uso prático de seus resultados permanece pouco explorado na literatura. Este estudo investiga este uso em organizações de PD&I agrícola, por meio de uma análise multicaso de oito instituições em três continentes. Embasado na responsabilidade social e ética da pesquisa e avaliação, responde à pergunta: 'Como as avaliações de impacto em organizações de P&D agrícola são realizadas e como seus resultados são utilizados para aprimorar a tomada de decisão estratégica e a inovação?' Para isso, desenvolveu-se e aplicou-se o modelo AGRIUM, focado nos objetivos, métodos, dimensões de impacto, usos e stakeholders. Os resultados indicam que nem a experiência com avaliações nem a diversidade de dimensões avaliadas influenciam o uso dos resultados. Três categorias de fatores de influência emergem: (1) estruturais e organizacionais, como a integração ao planejamento estratégico; (2) operacionais, incluindo qualidade e comunicação das avaliações; e (3) literacia da equipe e pressões de stakeholders. Estabelecer um processo bem definido, com gerenciamento de informações, documentação, práticas de feedback e monitoramento, foi identificado como essencial não apenas para potencializar pesquisas agrícolas impactantes, mas também para subsidiar decisões estratégicas e políticas institucionais.

Palavras-chave: pesquisa e desenvolvimento, gestão da inovação tecnológica e P&D, utilização de resultados de avaliação, avaliação de impacto.

1. Introduction

Historically, ex post impact evaluations have been formally conducted in agricultural Research, Development, and Innovation (RD&I) since the late 1950s (Colinet, 2021) and remain the most common approach in this sector (Horton & Mackay, 2003). Evenson (1982) emphasized that investments in Brazilian agricultural R&D have been key to productivity gains and economic growth, underscoring the need for structured impact evaluations to inform research strategies. Pereira & Castro (2020) further support this view, especially in the context of developing countries like Brazil. Given the increasing complexity of contemporary social challenges – especially in critical sectors such as agriculture, where research directly impacts food security, climate resilience, and sustainable development (Weißhuhn et al., 2018; Midmore, 2017; Pena Junior & Francozo, 2023; Cruz & Miranda 2022) – these evaluations must go beyond mere accountability tools (Patton & Horton, 2009; Saari & Kallio, 2011; Lee et al., 2020).

In this context, the results of impact evaluations gain particular relevance within paradigms like Responsible Research and Innovation (RRI) and Responsible Research Assessment (RRA), which emphasize aligning research practices and evaluations with societal needs and values (Felt, 2018). When properly utilized, these results can enhance the effectiveness and responsiveness of research to address pressing social and environmental challenges (Spaapen, 2015; Julnes & Mark, 1998).

However, as Van der Most (2010) and Milzow et al. (2019) highlight, discussions on how to use R&D evaluation results remain scarce. This gap becomes even more critical in agricultural research, where using evaluation results can significantly improve the sector's capacity to contribute to sustainable development goals (Joly et al., 2016; Pinto & Bin, 2024; Pinto et al., 2025).

A recent systematic review by Pinto & Bin (2024) indicates that discussions on this topic began in the 1990s, with agricultural organizations, particularly the Consultative Group on International Agricultural Research (CGIAR), playing a key role. Notable contributions from CGIAR authors include Horton & Mackay (2003), Mackay & Horton (2003), Hall et al. (2003), and Patton & Horton (2009). However, Pinto & Bin (2024) also observed a decline in studies on this topic after the early 2010s. Moreover, they highlighted the lack of empirical approaches to assess how evaluation results are utilized in agricultural RD&I organizations, with the exception of Joly et al. (2016). While Joly et al. (2016) examined the use of evaluation results in these organizations, their study did not address key contextual factors such as evaluation levels, assessed dimensions, involved stakeholders, or the barriers and drivers influencing the use of evaluation results.

To address this gap, this paper presents the first in-depth analysis of the practical use of impact evaluation results within agricultural RD&I organizations. Through a multi-case study involving eight organizations in Brazil, Colombia, New Zealand, Uruguay, Argentina, France and Ireland, this study seeks to answer the question: "How are ex post impact evaluations conducted, and what are the key factors that promote the effective use of evaluation results in agricultural RD&I management and strategy?" Using the AGRIUM model, this research examines the factors that facilitate or hinder the effective use of evaluation findings. To the best of our knowledge, this is the first empirical study to analyze how impact evaluations are practically utilized in this sector, providing actionable insights to strengthen strategic RD&I management.

2. Theoretical Foundation

The "use of evaluation findings" refers to their capacity to inform decision-making, negotiation processes, and influence stakeholders (Weiss, 1998). Since the 1960s, this topic has been

extensively explored in program and public policy evaluation[1] (Alkin & King, 2016; Mertens, 2016; Weiss, 1979, 1998). Patton's "Utilization-Focused Evaluation" (UFE) underscores the importance of defining an evaluation's purpose and audience from the outset, emphasizing the evaluator's responsibility in ensuring its findings are effectively applied (Patton, 2008). On the other hand, Preskill & Boyle (2008) advocate for evaluation capacity building (ECB), highlighting the role of leadership in ensuring the effective use of results. Other scholars highlight complementary aspects: Deniston (1980) focuses on methodological rigor, Cousins et al. (2014) stress stakeholder integration, and Mertens and Wilson (2018) propose a transformative approach, positioning evaluations as instruments for advancing social justice, sustainability, and equity.

Although well-established in program and policy evaluation, this topic remains underexplored in R&D evaluation (Pinto & Bin, 2024; Van der Most, 2010). Some studies have sought to address this gap. Milzow et al. (2019) identify key factors influencing result utilization, including evaluator expertise, stakeholder participation, data quality, evaluation planning, communication, and organizational support within funding agencies. Similarly, Morgan Jones et al. (2013, 2022) introduced the '4 A's' framework – Analysis, Advocacy, Allocation, and Accountability – distinguishing between internal and external applications of evaluation findings, as summarized in Table 1.

Table 1. A's of Evaluation.

A	Description	Application
Analysis	To understand why, how, and if research is effective, and how it can be better supported.	Internal
Advocacy	To demonstrate the benefits of supporting research and improve understanding of research and its processes among policymakers.	External
Allocation	To determine how to distribute funding through the research system.	Internal
Accountability	To evidence that money and other resources were used efficiently and effectively, and to hold stakeholders accountable.	External

Source: Developed by the authors based on Morgan Jones et al. (2013, 2022).

Building on this framework, Joly et al. (2016) highlight that in agricultural R&D, evaluation results are primarily used for accountability and advocacy, with less emphasis on organizational learning (Analysis). Horton & Mackay (2003) argue that enhancing this use requires generating robust syntheses and establishing effective information management. In this context, Horton & Mackay (2003), Mackay & Horton (2003), and Evenson (1982) stress the importance of integrating evaluation results into strategic planning to strengthen organizational learning. They further note that a broader range of evaluated dimensions increases the likelihood of utilization.

Despite these discussions, few structured approaches have been proposed to enhance their practical use in agricultural R&D, with Hall et al. (2003) and Patton & Horton (2009) standing out (Pinto & Bin, 2024). Hall et al. (2003) propose a model based on innovation systems, integrating institutional collaboration, learning, and systemic innovation to foster evaluation use. Similarly, Patton & Horton (2009) introduce the UFE-based "Adaptive Cycle," emphasizing proactive user engagement, continuous feedback, and stakeholder interaction to ensure evaluations are user-centered and impartial in agricultural RD&I organizations.

Although these models have advanced practice-oriented evaluations, they often lack broader applicability for diagnostic analyses that establish an overview of evaluation processes and result utilization in agricultural R&D. While Hall et al. (2003) emphasized systemic innovation and Patton & Horton (2009) focused on stakeholder engagement, neither provided a structured

[1] In this field, Alkin & Christie (2023) conceptualized an Evaluation Tree, identifying three main branches: Methods, Valuing, and Use. Among these, the 'Branch of Use' is specifically dedicated to exploring how evaluation results are utilized

mechanism to ensure the long-term integration of evaluation results into organizational decision-making. To address these gaps, the following section introduces the AGRIUM model, a structured, multi-dimensional approach that not only diagnoses evaluation gaps but also provides an actionable framework for integrating impact evaluation results into strategic planning and decision-making.

2.1 Agricultural Research Impact and Utilization Model (AGRIUM)

The "AGRIUM" model was designed to support contextual analyses of how impact evaluations are conducted, while also providing practical guidance for planning such evaluations. It draws on the literature previously discussed, including the European Commission's impact assessment guidelines (European Commission, 2023). The model consists of five key components: (1) Level of Evaluation; (2) Type of evaluation Design; (3) Dimensional Analysis; (4) Use of Evaluation; and (5) Public, as shown in Figure 1.

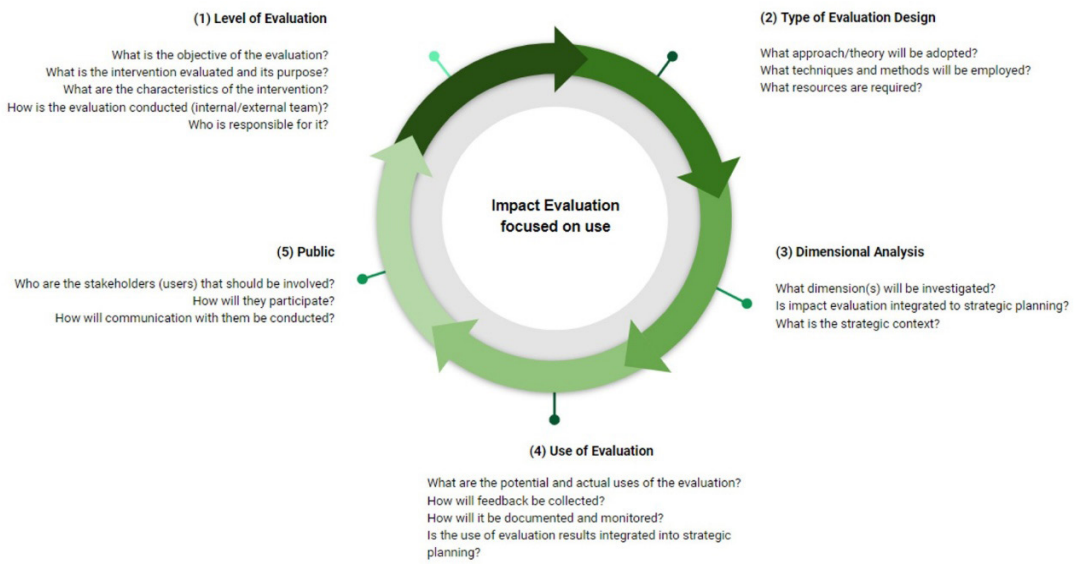

Figure 1. Agricultural Research Impact and Utilization Model (AGRIUM).
Source: Developed by the authors.

Its circular structure reflects the understanding that evaluation is a dynamic, interactive process, integrating diverse perspectives, methods, and objectives throughout its cycle. This design also symbolizes the interconnectedness of its components, emphasizing that decisions made at one stage directly influence the others. In this framework, the (1) 'Level of Evaluation' vector focuses on identifying and understanding both the evaluation object (the research action) and the evaluation process itself. It addresses key questions such as: What is being evaluated? What are the objectives and characteristics of the RD&I intervention (e.g., scope, scale, and operational context)? Why is the evaluation being conducted? How is it conducted (internal/external)? Who is responsible for it? By clarifying these aspects, this vector defines the evaluation's purpose and scope, laying the foundation for understanding its rationale and anticipating how its findings will inform decision-making, policy development, or other strategic actions.

The (2) 'Type of Evaluation Design' vector focuses on how the evaluation is planned in terms of approach, methods, team, and resources. Building on the objectives outlined in (1) 'Level of Evaluation,' it defines the evaluation typology (ex ante or ex post, as described by Gertler et al. (2018)) and the methodological approach (experimental, quasi-experimental, or non-experimental, according to Newcomer et al. (2015)). Additionally, it underscores that the chosen design and methods can directly influence utilization, as highlighted by Deniston (1980), Cousins et al. (2014), and others.

The (3) "Dimensional Analysis" vector defines what is being evaluated in terms of intended effects and contexts. Joly et al. (2016) highlight that agricultural research organizations aim to demonstrate their influence and capacity for change across 'economic dimensions' – financial (productivity, income, profit), environmental, and technological – and 'non-economic dimensions' – social, political, organizational, and scientific. This vector provides a critical framework for organizations to assess both the actual and potential impacts of their interventions across these dimensions, enabling strategic adjustments and optimizing utilization in diverse contexts and for multiple stakeholders, both internal and external.

In vector (4) "Use of Evaluation," it is essential to identify both actual and potential applications, based on the previous vectors and the principles outlined by Patton (2008, 2011), along with factors that may influence them. This vector also emphasizes how evaluation use is documented as a process and its connection to the organizational context. Additionally, it addresses aspects of monitoring and feedback, as outlined in Patton's UFE framework (2008) and further reinforced by FTeval (2003) and OECD (2023), which stress the importance of ongoing communication with stakeholders directly or indirectly involved.

Vector (5), "Public," refers to the various interest groups and stakeholders affected by the research intervention, as well as those who can utilize evaluation results to support decision-making or guide actions in RD&I. In this context, both their participation and influence in evaluation processes and decision-making are crucial, as highlighted by Stockmann et al. (2020, 2022) and Díez et al. (2016). This vector also includes public policy managers and control agencies. Stakeholders can be categorized based on their relationship with agricultural and RD&I policies, including policymakers, researchers and academics, funding organizations and agencies, farmers and rural producers, and society at large. The AGRIUM model will be applied in this study to examine the use and impact of evaluation results in agricultural research. The following section (Methodology) details its implementation.

3. Methodology

The multi-case study employed qualitative research to explore the nuances of the evaluation process and the use of results in agricultural RD&I organizations. Convenience sampling[2] (Stratton, 2021) was used to select the organizations, and the 'snowball method' (Parker et al., 2019) was applied to select the participants. Primary data were collected through surveys, interviews, and direct observations, following the guidelines of Creswell and Yin (Creswell, 2013; Creswell & Creswell, 2018; Yin, 2009), while secondary data came from documentary analyses of organizational reports and websites. This approach was informed by Pinto & Bin's (2024) findings, which identified case studies (interviews and surveys) combined with document analysis as the most commonly used techniques in empirical studies aiming to understand the

[2] We adopted specific selection criteria for the actors, which include: 1. their position/role (evaluator or RD&I manager); 2. their activities, such as researchers leading research projects or managers coordinating Innovation and RD&I teams; and 3. their knowledge/production, including technical and scientific expertise in the fields of impact evaluation and RD&I management.

use of evaluation results. Data collection instruments and analysis were further guided by the literature organized for the development of the operational model AGRIUM presented earlier. Figure 2 synthesizes the steps adopted in this study.

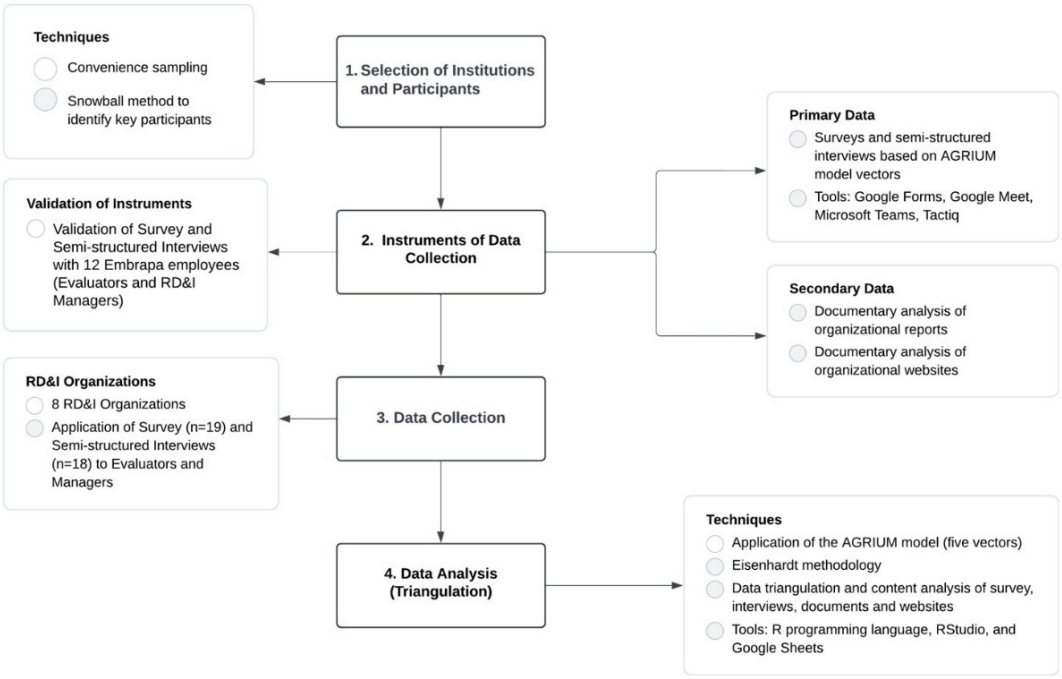

Figure 2. Overview of Methodological Steps.
Source: Developed by the authors.

3.1 Selection and Characterization of Organizations and Participants

Eight organizations (Table 2) were selected through convenience sampling (Stratton, 2021), taking into account data accessibility and existing professional contacts. Additionally, the selection considered that these organizations are the leading agricultural RD&I organizations in their respective countries (except for CGIAR, which operates as a network, and CIRAD, which conducts activities in multiple countries). Efforts were made to involve representatives from CSIRO, INRAE, and IRTA, but required information could not be obtained within the timeline. Key representatives with pivotal roles in evaluation and RD&I management were prioritized, ensuring insights from deeply engaged individuals. Using the 'snowball method' (Parker et al., 2019), 20 experts[3] were identified. Of these, 18 participated in interviews and 19 completed the survey, with roles detailed in Table 3.

The study aimed to involve evaluators and RD&I managers from all organizations. However, due to access difficulties, only five of the eight organizations had representatives from the actors involved in RD&I[4] management.

[3] Theoretical saturation was determined by the application of these predefined scripts, which set the data collection boundaries, ensuring consistency across participants. The iterative selection of interviewees through Convenience and Snowball Sampling (Stratton, 2021; Parker et al., 2019) continued until no substantially new insights emerged, reinforcing the robustness of the collected data.

[4] For them, the information was collected via electronic form, with interviews occurring for some.

Table 2. Characterization of participating Organizations.

Characteristics	AgResearch	Agrosavia	CGIAR	CIRAD	Embrapa	INIA	INTA	Teagasc
Name	AgResearch Limited	Corporación Colombiana de Investigación Agropecuaria	Consultative Group on International Agricultural Research (CGIAR)	Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD)	Empresa Brasileira de Pesquisa Agropecuária (Embrapa)	Instituto Nacional de Investigación Agropecuaria (INIA)	Instituto Nacional de Tecnología Agropecuaria (INTA)	Agriculture and Food Development Authority (Teagasc)
Creation (Year)	1992	1991	1971	1984	1973	1989	1956	1988
Affiliation	Crown Research Institute (CRI) and Ministry of Science and Innovation, New Zealand	Ministry of Agriculture and Rural Development	-	Ministry of Higher Education, Research and Innovation and Ministry of Europe and Foreign Affairs	Ministry of Agriculture, Livestock, and Supply (MAPA)	Ministry of Agriculture, Livestock and Fisheries	Ministry of Agriculture, Livestock, and Fisheries	Minister for Agriculture, Food and the Marine
Country	New Zealand	Colombia	France (Global Operations)	France	Brazil	Uruguay	Argentina	Ireland
Continent	Oceania	South America	Africa, Asia, and Latin America	Europe	South America	South America	South America	Europe
Mission	Improve the value, productivity, and profitability of New Zealand's pastoral, agri-food, and agrotechnology sectors through effective science.	Generate agricultural scientific and technological knowledge through scientific research, technology adaptation, transfer, and advising.	Reduce poverty and achieve food security in developing countries through agricultural research.	Contribute to the resilience of agriculture for a more sustainable and united world.	Enable research, development, and innovation solutions for the sustainability of agriculture, benefiting Brazilian society.	Produce and adapt knowledge and technologies to contribute to the sustainable development of Uruguay and the agricultural sector, considering state policies, social inclusion, and market and consumer demands.	Drive innovation and contribute to the sustainable development of a competitive, inclusive, equitable, and environmentally careful Agricultural and Food System (SAAA) through research, extension, technology development, contributions to public policy formulation, and national and international cooperation and networking.	Provide scientific leadership and support to Irish farmers and food companies in achieving a sustainable food system.

Source: Developed by the authors.

Table 2. Continued...

Characteristics	AgResearch	Agrosavia	CGIAR	CIRAD	Embrapa	INIA	INTA	Teagasc
Budget (2023)	NZ$178 million US$110.36 million	COP 250 billion US$ 81.5 million	USD 923 million	€220 million US$239.8 million	BRL 3.639 billion US$720 million	USD 49,192	USD 88.179 million	€217 million US$236 million
Country's Population	5.123 million	51.52 million	-	67.75 million	214 million	3.426 million	45.81 million	5.13 million
Rural Population (%)	14%	24%	-	20%	15%	5%	8%	37%
Research Centers/ Units	4 research units and 6 laboratories	23 regional offices	20 research centers; operations in 89 countries	29 units in 10 countries	42 units; 4 international cooperation laboratories (USA, Europe, China, and South Korea)	5 experimental stations	14 regional centers and 6 research centers	7 research centres, 12 Advisory Regions (52 Advisory Offices)
Main Research Lines	Food and Bioproducts; Plants and Animals; Climate Change; Sustainable Farming Systems; Kaupapa Māori and Transformational Initiatives	Bioeconomy; Climate-smart and sustainable agriculture; New agri-food systems - Integrated and sustainable production models; Food and nutritional security, human and animal health; Social inclusion in technological development	Wide range of research lines, focusing on improving food security, nutrition, and agricultural resilience to climate changes, genetic improvement, sustainable agricultural practices, natural resource management, and agricultural policies	Agroecological transitions; Biodiversity; Climate change; Food systems; One Health; Territory-based approaches	Public policy support programs, genetic improvement programs, organizational development programs, international programs, co-financed programs	Livestock, agriculture, dairy, forestry, and plant production from extensive family farming through to intensive production, as well as integrated crop-livestock production systems	Agricultural innovation, sustainability, food security, rural economics, biotechnology, family farming, and public policy	Research and Innovation in Animals and Pastures, Environment and Land Use, Food; Rural Economy and Development
Human Resources	852	1.891	8.270	1.650	7.712	703	5.714	1.360
R&D Human Resources	490	778		800	2.151	120	3.216	700
Region of Operation	New Zealand	Colombia	Africa, Asia, and Latin America	France; South America, Africa, Southeast Asia	Brazil; Asia, Europe, and the United States	Uruguay	Argentina	Ireland
Website	agresearch.co.nz	agrosavia.co	cgiar.org	cirad.fr	embrapa.br	inia.uy	argentina.gob.ar/inta	teagasc.ie

Source: Developed by the authors.

Table 3. Characterization of the population involved[5].

Organizations	Participant profile[6]	Participants		
		Total	Evaluators	RD&I managers
Embrapa	Evaluator (G, P), Team/Group Leader (L,T,R), Manager (L,T), Researcher (T)	5	2	3
AgResearch	Researcher (J), Manager (M), Project/ Program Coordinator (H), Evaluator (R), Data/Statistics Analyst (R)	4	2	2
Agrosavia	Researcher (A), Evaluator (G), Manager(A)	2	1	1
INIA	Manager	1	1	0
Teagasc	Researcher, Evaluator, Manager	1	1	0
INTA-AR	Manager (D), Decision Maker/Executive (L), Researcher (S)	3	1	2
CIRAD	Evaluator (M, C), Manager (A)	3	2	1
CGIAR	Researcher (R), Team/Group Leader (R), SPIA Technical backstopping on impact assessment methods (R)	1	1	0

3.2 Data Collection Instruments and Validation

Two scripts were developed for the survey and interview, incorporating elements from AGRIUM's five vectors. Data from agricultural RD&I organizations' websites and reports was limited to the period of September 2023 to March 2024. The study's data collection instruments, including questionnaires and interview guides, are available on Github[7]. The scripts[8] were validated from July to August 2023 with 12 participants, including evaluators, RD&I managers, and Embrapa researchers. The survey, structured in Google Forms in English and Portuguese, consisted of four sections with 66 open and closed questions. Semi-structured interviews, conducted online via Google Meet and Microsoft Teams, supplemented the survey. Transcriptions were supported by the Tactiq application[9]. Data were collected between September 2023 and February 2024 in Portuguese, English, and French.

3.3 Data Analysis

AGRIUM was applied to analyze the collected data using its five vectors. Eisenhardt's (2021) methodology was also employed, as it is particularly effective for addressing research questions in areas with limited prior theoretical development. This approach emphasizes iterative data analysis in blocks – represented by the model's vectors – and the development of theoretical arguments based on observed patterns. For each vector, an analytical synthesis was created, summarizing findings and supporting further discussion and theory development. Content analysis (Bardin, 2011) was employed to systematically organize and interpret information collected from interviews, documents, and websites. Data triangulation (Creswell & Creswell, 2018) further strengthened the reliability of interpretations. Data processing and organization were conducted using R, RStudio, and Google Sheets.

[5] The organizations were formally invited to participate in the study, and the collected data were subsequently submitted to them for validation.

[6] The letters correspond to identification codes for each participant, based on their profiles.

[7] Available at: < https://bit.ly/4e35qEb >.

[8] The Ethics Committee of the University of Campinas (Unicamp) analyzed, validated and approved the data collection on August 8, 2023. Process number: 70426823.0.0000.8142.

[9] Available at: https://tactiq.io/

4. Results and Discussion

4.1 Level of Evaluation

On average, organizations began evaluations 20 years after their creation, with CGIAR and Embrapa having the longest experience. Impact evaluations typically focus on projects, followed by technologies and innovation programs, in that order, with varying objectives and frequencies. Half of the organizations evaluate projects and innovation programs to justify external funding, with evaluations ranging from annual to context-dependent (Table 4). At Teagasc, the evaluation team, supported by external evaluators, prioritizes annual evaluations, while projects without external funding are independently evaluated by researchers, sometimes with team support.

At AgResearch, evaluations are carried out by an internal team and focus on funded projects, conducted annually to report science impact to the New Zealand government (AgResearch, 2021). INIA conducts evaluations in cycles funded by the Inter-American Development Bank (IDB), with the most recent covering 2010 to 2022 (Pareja et al., 2011). Recently, the organization started a new evaluation for the period 2010 to 2022, according to information published on the "Llamados" section of its website. CGIAR evaluations vary by center and funded projects, coordinated by SPIA[10] (Standing Panel on Impact Assessment), although each center has autonomy to set its own evaluation agenda, allowing flexibility and local adaptation.

Other organizations conduct their evaluations with different contexts and purposes. At CIRAD, evaluations are voluntary, requested by researchers aiming to measure the impact of projects or programs. External support is common, and efforts are underway to promote a "culture of impact" to integrate evaluations more deeply into strategic planning (Blundo-Canto et al., 2019; Ferré et al., 2025). These evaluations also meet the requirements of the "High Council for Evaluation of Research and Higher Education" (HCÉRES), which reviews CIRAD every four years.

On the other hand, Agrosavia and Embrapa conduct annual evaluations of developed technologies selected by leaders and RD&I managers. These evaluations contribute to Social Balance reports, which present the societal benefits of the technologies to society (AGROSAVIA, 2024; Embrapa, 2024b). At Agrosavia, a team of about 30 people conducts evaluations of dozens of technologies (AGROSAVIA, 2024), generated by the organization's research centers. This team is physically located at Agrosavia's headquarters in Bogotá. In the case of Embrapa, the Supervision of Strategy Monitoring and Evaluation (SME) guides the teams of the 42 research centers to conduct annual impact evaluations. In this case, it is the teams from each research center, totaling more than 100 people, who carry out the evaluations under the guidance of SME. These guidelines cover everything from the evaluation design to the structure of the report to be presented.

Analytical synthesis 1:

- The focus, objectives, and frequency of evaluations vary, as well as the experience, and involvement of internal or external teams. Evaluations range from mandatory annual assessments to voluntary, researcher-led processes, often conducted to justify external funding or public investment, demonstrating the impact of research to society.

[10] Each center has the autonomy to plan and conduct impact assessments, while being encouraged to follow SPIA's guidelines and quality standards. This decentralized approach allows flexibility in applying evaluation methods suited to each center's unique context. SPIA also acts as a facilitator, connecting CGIAR centers with stakeholders and the broader impact evaluation community to promote the exchange of experiences and outcomes.

Table 4. Level of impact evaluation.

Characteristics	AgResearch	Agrosavia	CGIAR	CIRAD	Embrapa	INIA	INTA	Teagasc
When IE Began	2010	2017	1972	2005	1997	2007	2000	2003
Experience (years)	13	6	51	18	26	16	23	20
Responsible Department	Institutional Administration/ Management	Research and Development	Research and Development (SPIA)	Research and Development	Institutional Administration/ Management (SME)	-	Monitoring and evaluation	Evaluation Unit
Evaluation Execution	Internal team	Internal team	Both internal and external teams	Both internal and external teams	Internal team	External team	Both internal and external teams	Both internal and external teams
Evaluation Focus	Research projects (external funding)	Developed technologies, Strategic partnerships	Research projects, Developed technologies, Innovation programs (external funding)	Research projects, Developed technologies, Innovation programs	Research projects, Developed technologies	Research projects, Innovation programs (external funding)	Research projects, Innovation programs	Research projects, Innovation programs (external funding)
Evaluation Frequency	Annually, for Specific Projects (funded)	Annually, for specific technologies	Varies, according to the CGIAR'centers, Specific Projects (funded)	Varies, depending on the interest by R&D team, Specific Projects	Annually, for specific technologies	On demand from funders	By demand/ initiative of researchers or others actors	Annually, for Specific Projects (funded)
Evaluation Team (Amount of people involved)	Small group (2-5 people)	More than 20 people	More than 20 people	Small group (2-5 people)	More than 20 people	-	Small group (2-5 people)	Medium group (6-10 people)
Observation	Evaluations serve as a basis for the organization to report to the New Zealand government, as detailed in the "Statement of Corporate Intent" (AgResearch, 2021).	Established process. Evaluations occur annually, mandatory to produce the Social Balance.	CGIAR stands out for its systematic and rigorous approach to measuring different impacts of its agricultural research and development interventions.	Every four years, CIRAD undergoes a regular evaluation coordinated by the "High Council for the Evaluation of Research and Higher Education" (HCÉRES).	Established process. Evaluations occur annually, mandatory to produce the Social Balance.	INIA conducts impact evaluations irregularly, with the first evaluation taking place in the 2000s, initiated by demands from the main external funder, IDB.	INTA conducts impact evaluations irregularly. In 2020, a project focused on impact evaluations of agroecology initiatives was implemented by a researcher at the institute.	-

Source: Developed by the authors.

4.2 (2) Type of Evaluation Design

There is significant variation in evaluation techniques, with organizations using quantitative, qualitative, and mixed methods, often leaning toward non-experimental evaluations. CIRAD, CGIAR, and Embrapa have developed their own methods tailored to RD&I interventions. CIRAD, for example, created the ImpreS method in the 2010s. According to participant C, it is a "*qualitative, non-experimental method based on a theoretical and participatory approach*," designed to assess RD&I impacts in the Global South through case studies and stakeholder participation. Recently, CIRAD has expanded its evaluations with mid-term and final assessments using Outcome Trajectory Evaluation (OTE) (Barret et al., 2017; Douthwaite et al., 2023).

Similarly, CGIAR, through SPIA, developed the 'SPIA Approach to Impact Assessment,' which combines quasi-experimental methods with theories of change (ToC) (Rogers, 2014; Mayne, 2015). Participant R explained that while the approach has a "*quantitative and experimental focus*," it balances this with "*quasi-experimental techniques and theory-based assessments*", allowing flexibility and adaptation to different contexts. The goal is to identify "big wins", meaning high-impact innovations, using counterfactuals and detailed adoption documentation (CGIAR, 2020).

Embrapa developed the "System for Evaluating Environmental Impacts of Agricultural Technological Innovations" (Ambitec-Agro; Ambitec-TICs) (Rodrigues et al., 2003; Pinto et al., 2021). Additionally, the organization adopts the Economic Surplus[11] method (Ávila et al., 2008). At Embrapa, participant 'G' explained that while this approach is "*similar to an experimental method*," it lacks "*full control over variables or complete randomization*." For example, Embrapa compares farms adopting new technologies with neighboring farms using traditional methods, without controlling for factors like soil type or management practices (Rodrigues et al., 2003; Ávila et al., 2008).

At AgResearch, participant 'R' mentioned that evaluations are "*conducted on an ad-hoc basis, with less structure*," though the organization is interested in adopting frameworks like the CSIRO Impact Evaluation Guide (CSIRO, 2020). However, 'R' noted, "*limited resources and organizational constraints have hindered full implementation*". INIA follows a non-experimental approach, using traditional metrics such as Economic Surplus and rates of return.

Teagasc applies qualitative methods, theory-based evaluations, and OTE to track intervention effects over time. Agrosavia and INTA use mixed methods, with Agrosavia adopting Embrapa's Ambitec-Agro and Economic Surplus models. INTA combines various methods to assess impacts, occasionally incorporating Embrapa's Ambitec-Agro methodology in research on organic production. The diversity of approaches and methods adopted by these organizations is summarized in Table 5.

Participants identified 'understanding and applying evaluation methodologies' and 'communicating results clearly' as the most critical competencies for evaluations. Three organizations also highlighted the importance of 'adaptability to challenges,' 'effective data collection,' 'problem identification,' and 'understanding organizational needs.' Other skills, such as 'data analysis,' 'supporting R&D initiatives,' 'collaborating with stakeholders,' and 'critical thinking,' were noted but seen as complementary to core competencies.

Participants also emphasized the lack of resources, with financial limitations and personnel shortages being common challenges. Evaluation Capacity Building (ECB) occurs in only half of the organizations, primarily through manuals, guides, and workshops, with effectiveness perceptions ranging from ineffective to very effective. AgResearch has focused on ECB development since the 2010s (White et al., 2018; Turner et al., 2022). At INIA, while there is no formal impact evaluation process, the participant noted, "*there are employees dedicated to the topic, which has opened opportunities for competency development*" (Turner et al., 2022).

[11] Embrapa and Agrosavia thus calculate return rates, benefit-cost ratio (B/C), and net present value (NPV).

Table 5. Design of the evaluation.

Organizations	Approach	Methodology used	Type
CGIAR	Experimental, Quasi-experimental	SPIA Approach to Impact Assessment	Quantitative
CIRAD	Non-experimental, Theory-based, participatory	ImpresS	Qualitative
AgResearch	Non-experimental	Tend to apply CSIRO's framework	Quantitative
Agrosavia		Ambitec-Agro; Economic Surplus	Mixed
Embrapa		Ambitec-Agro; Ambitec-TICs; Economic Surplus	
INTA		-	
INIA Uruguay		Economic Surplus	Quantitative
Teagasc		Outcome trajectory evaluation	Qualitative

Source: Developed by the authors.

Analytical synthesis 2:

- The diversity of evaluation methodologies adopted by organizations reflects the need to balance methodological rigor with practical constraints, such as available resources and the skills of evaluation teams.

4.3 (3) Dimensional Analysis

Most organizations conduct multidimensional impact assessments, primarily covering economic, environmental, social, and organizational aspects (Figure 3). At CGIAR, impact types vary by intervention, but the organization, like CIRAD, has experience measuring multiple dimensions. Embrapa and Agrosavia follow a standardized impact evaluation process, assessing technologies for economic, environmental, social, and institutional impacts. Scientific, financial, and governance impacts are the least commonly measured. Scientific impact relates to production and citation metrics, while financial impact concerns research funding sustainability, budget efficiency, and financial transparency in R&D management. Governance impact evaluates how RD&I shapes governance practices, leadership structures, and policies with broader societal goals.

When it comes to integrating the impact evaluation into strategic planning, all participants recognize its need and importance. In six out of eight organizations, they confirm that this integration exists, but they also agree that it needs to be improved. Additionally, they emphasize the need to incorporate ex post impact evaluation into strategic planning from the outset of research proposal formulation.

Among the organizations that have already made progress in this direction, Agrosavia and Embrapa stand out for demonstrating greater integration of impact evaluations into their organizational processes. In both cases, this integration is the result of an established internal process for conducting annual impact evaluations to produce the Social Balance. As observed by participant "G" from Agrosavia: *The annual production of the Social Balance is integrated into Agrosavia's strategic planning. Additionally, in recent years, we have promoted a culture of impact, with the aim of changing the mindset of researchers and decision-makers*. However, the participant acknowledges that this culture relies on broader, long-term initiatives, as well as organizational strategies.

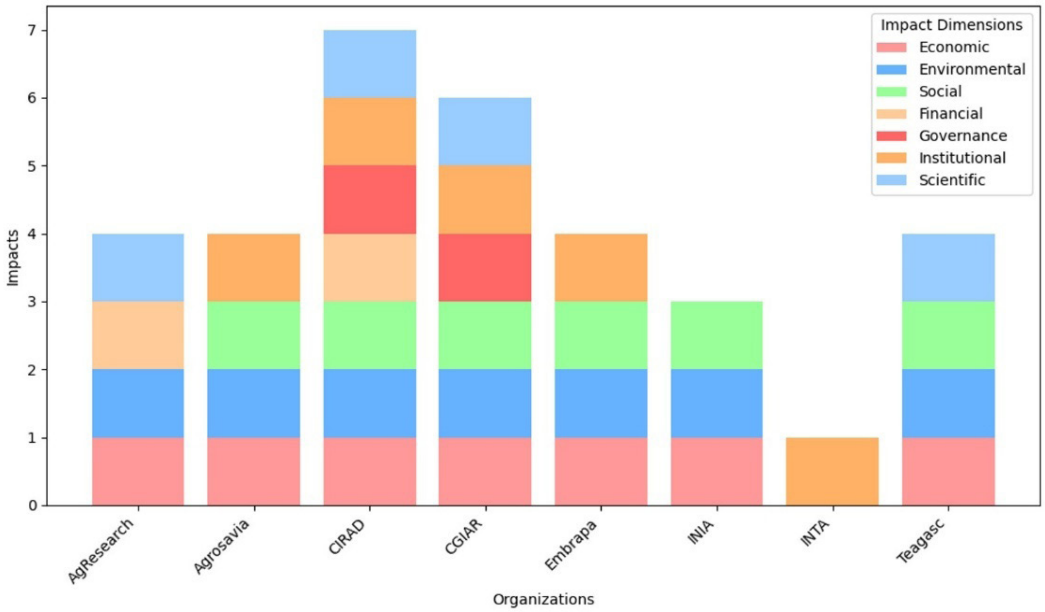

Figure 3. Types of impacts assessed by the Organizations.
Source: Developed by the authors.

In the case of Embrapa, this integration goes beyond the Social Balance. It was observed that ex post impact evaluations have been incorporated into the performance evaluation of the company's 42 research units. Since 2018, these evaluations have served as an effectiveness indicator for each unit and have indirectly influenced the professional progress of the teams (Embrapa, 2024a). This indicator is part of the 'Innovation and Technology Transfer' actions, whose relevance has grown from 15% to 40% of the total value in this group in recent years. According to "G," a participant from Embrapa: *This is a recognition of impact evaluation as a strategic tool, but we need to continue finding ways to demonstrate the value of our work*, suggesting that evaluators must seek ways to give visibility to the work being done.

Analytical synthesis 3:

- The predominant focus on economic and environmental dimensions, followed by social dimensions, may suggest a more accountability-oriented approach, prioritizing results demonstration over strategic learning. This prioritization reflects an evaluation model that primarily seeks to justify the effectiveness of interventions.

4.4 (4) Use of evaluations

When investigating the use of impact evaluation results, both evaluators and RD&I managers shared similar views on their application regarding the 4 A's of Evaluation: Accountability, Analysis, Advocacy, and Allocation. The first three A's showed strong alignment, while Allocation varied (Figure 4).

Seven of the eight organizations identified accountability as the primary use, aimed at legislative bodies, clients, and the public - except for CIRAD, where evaluations are researcher-driven. Analysis, noted by CGIAR, CIRAD, Agrosavia, INTA, and Teagasc, involves real-time support for project planning, as CIRAD's participant 'A' highlighted: "*There is a challenge in establishing a cycle that integrates evaluation with strategic management*."

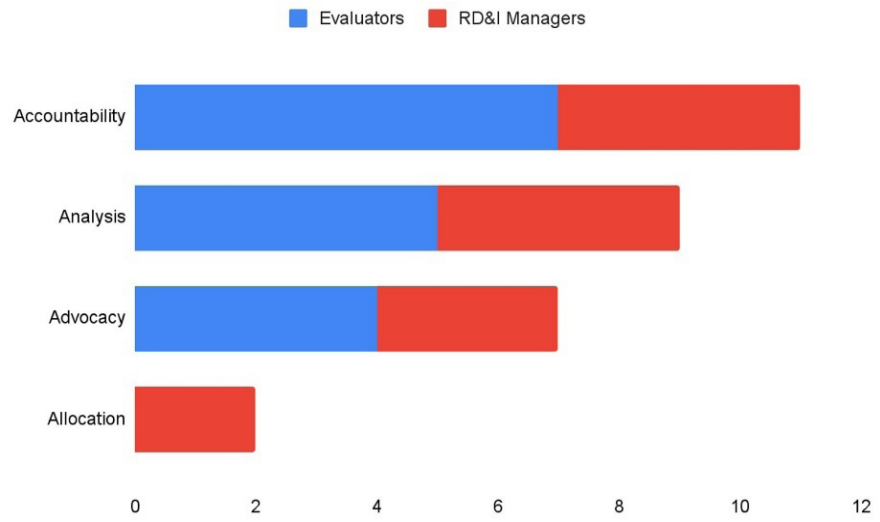

Figure 4. Types of use by actors, according to Morgan-Jones et al.'s proposal (2013; 2017).
Source: Developed by the authors.

At Agrosavia, interaction between evaluation and RD&I teams enhances use. According to participant 'G', "*different documents from the same evaluation are produced and sent to managers and those directly responsible*." Advocacy was recognized by AgResearch, CGIAR, CIRAD, and Embrapa, with Embrapa's "Social Balance" report, created to secure public funding, as a key example. Participant 'G' noted, "*The document is used with parliamentarians to ensure funding*." Allocation was less emphasized, mentioned only by AgResearch and Agrosavia RD&I managers. AgResearch's participant 'M' expressed a desire for "*a more structured approach across the 4 A's, particularly in Allocation*," stressing the need to integrate results into decision-making.

4.4.1Factors which determines use of evaluation in R&D agricultural organizations

Participants identified seven factors influencing the use or non-use of results: Organizational Support, Missing Resources, Relevance, Quality and Communication, Timing, Impact Evaluation Literacy, and Others. These were grouped into three categories, as shown in figure 5: 1. Structural and Organizational Factors, where leaders and decision-makers play a key role; 2. Operational Factors, led by evaluation teams and RD&I managers; and 3. Applicability Factors, involving evaluation teams, RD&I managers, and external stakeholders.

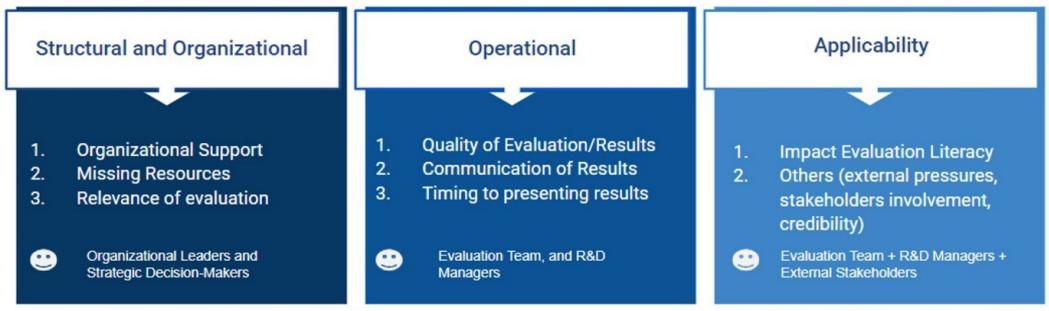

Figure 5. Categories mentioned as relevant to use and non-use.
Source: Developed by the authors.

1. Structural and Organizational Factors: These foundational elements shape how evaluations are integrated into operations. Organizational Support is crucial, as CIRAD's participant 'A' emphasized: "*Evaluation, oriented toward reflexivity and adaptation, is key for the agricultural sector... We need adapted approaches to tackle complex problems, including all stakeholders.*" Missing Resources, as noted by Embrapa's evaluator 'P', *often limit the quality and scope of evaluations*. Relevance is tied to aligning evaluation results with strategic priorities, as Embrapa's manager 'R' stated: "*Researchers integrating evaluation results into R&D should receive benefits, and decisions should be based on these results*."
2. Operational Factors: These focus on how evaluations are conducted and communicated. Many participants pointed out that long, technical reports hinder result usage. AgResearch's manager 'M' stressed the need for communication "*at various levels: from a snapshot to in-depth analysis, depending on the audience.*" Agrosavia's participant 'A' highlighted the importance of outreach through "*social media and infographics to enhance understanding*". Timing of results is also critical, ensuring alignment with RD&I agendas.
3. Applicability Factors: These address how organizations apply results and the external pressures they face. Impact evaluation literacy within teams is essential for effective application. Additionally, external pressures and the credibility of the information, shaped by methodology and team skills, can either facilitate or hinder the use of evaluation results.

4.4.2 Responsibility for the use of evaluation results and documentation of process

When asked about the responsibility for using evaluation results, participants pointed to three main actors, in this order: 1. evaluator, 2. RD&I manager/researcher, and 3. organizational leader/general manager. Most evaluators believe it is their role to create strategies to enhance the use of the results, but they recognize the lack of resources, especially human resources, as an obstacle. They also suggest that usage can be expanded with greater interest and support from the RD&I manager, integrating evaluation into the RD&I process. In turn, RD&I managers see responsibility as more balanced between evaluators, managers, and leaders, and suggest that strategic planning areas consider evaluations as a central source for research management.

In terms of documenting the process of using evaluation results, it is noteworthy that none of the organizations have well-established documentation practices. While CIRAD and Embrapa have systems in place to record evaluation information, access is generally restricted to evaluators. Additionally, with the exception of Embrapa, a standardized and established process for collecting stakeholder feedback from evaluations was not observed. At Embrapa, this process occurs internally through an evaluation committee that reviews impact reports produced by evaluation teams in the context of unit performance evaluations. This committee assesses aspects related to report structuring, techniques employed, actors involved, results achieved, among other elements (Embrapa, 2024a).

Analytical synthesis 4:

- The absence of a formal, documented and systematic organizational process for utilizing the results means that their application often relies on the individual efforts of evaluators, managers, and researchers. This ad hoc approach limits the potential to integrate evaluation findings into organizational strategic planning, preventing them from being consistently and strategically used to guide RD&I decision-making.

4.5 (5) Public

Stakeholder Engagement

Regarding stakeholder involvement in impact evaluations, all organizations mentioned this importance. In this sense, we noted the involvement of internal and external actors. Among the main internal actors are: employees, particularly researchers, who are responsible for the evaluated intervention and RD&I managers and leaders (Figure 6). This is common for seven organizations, with the exception of INTA, which did not specify the actors typically involved in their impact evaluations, despite conducting these evaluations irregularly.

The involvement of external actors includes customers, partners, associates, and regulatory bodies. Customers, who are the direct beneficiaries (such as extension workers and farmers), are involved in impact evaluations at six of the eight organizations (Agrosavia, CGIAR, CIRAD, Embrapa, INIA, and Teagasc). Partners and regulatory entities are involved at the third and fourth levels, respectively. CGIAR, CIRAD, and INIA collaborate with these external actors. CGIAR, in particular, has a broad range of stakeholders who can participate in the evaluation process, depending on the specific context.

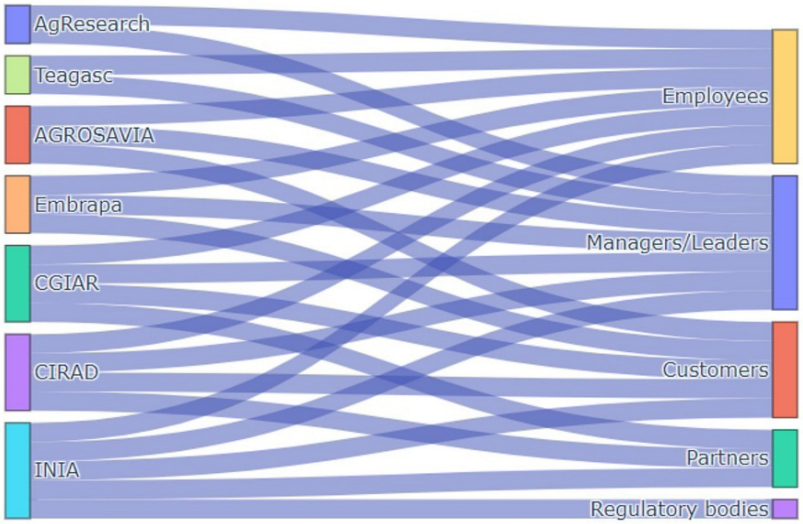

Figure 6. Main stakeholders involved.
Source: Developed by the authors.

The involvement of external stakeholders occurs mainly at specific stages of the evaluation, being more common in data collection and information verification. Thus, these actors serve almost exclusively as data sources for the evaluations, although the benefits of their inclusion are linked to factors such as 'Increase in the legitimacy of actions', 'Better decision-making', 'Increase in trust and transparency', 'Promotion of innovation', 'Strengthening engagement and commitment', and 'Broader identification of risks and opportunities'. Only INIA mentions involving regulatory agents and partners throughout the evaluation process.

In general, evaluation reports are communicated to stakeholders via emails, posts, and organizational news articles. In three of the organizations (Agrosavia, INTA, and CGIAR), meetings and workshops are also commonly used to present the results to the R&D team, further illustrating the need for adaptable communication strategies to enhance the applicability and use of evaluation results.

In addition to these communication strategies, an analysis of websites reveals that most organizations have dedicated pages providing information on the impact evaluation of their research. These pages typically describe evaluation methods and processes, providing access to data and reports. CGIAR's results dashboard (CGIAR, 2025) and Agrosavia's platform (AGROSAVIA, 2024) offer broad insights into the impact of their actions. Embrapa's Social Balance page (Embrapa, 2024b), in turn, provides the most extensive historical record, with full reports dating back to the 1990s.

Analytical synthesis 5:

- Internal actors, such as researchers and RD&I managers, are consistently involved in evaluations, while the engagement of external actors, especially customers and partners, remains more limited and is generally restricted to specific stages of the evaluation process, such as data collection and information verification. Similarly, there is a need for more dynamic communication strategies, beyond traditional methods, to ensure the effective dissemination and utilization of evaluation results.

5. Conclusions

The application of the AGRIUM model revealed that evaluations are primarily conducted to meet funders' and societal needs, yet their results are rarely utilized by organizations, particularly in RD&I. Notably, organizational experience – such as that of CGIAR and Embrapa, among the oldest in conducting impact studies – does not directly influence result utilization. Instead, our findings confirm that leadership support must be reinforced by formal processes (Preskill & Boyle, 2008) to ensure the continuous integration of evaluation results into RD&I agendas (Milzow et al., 2019). The analysis of vectors (Figure 7) provides insights into how evaluation processes can be structured to better support and benefit RD&I.

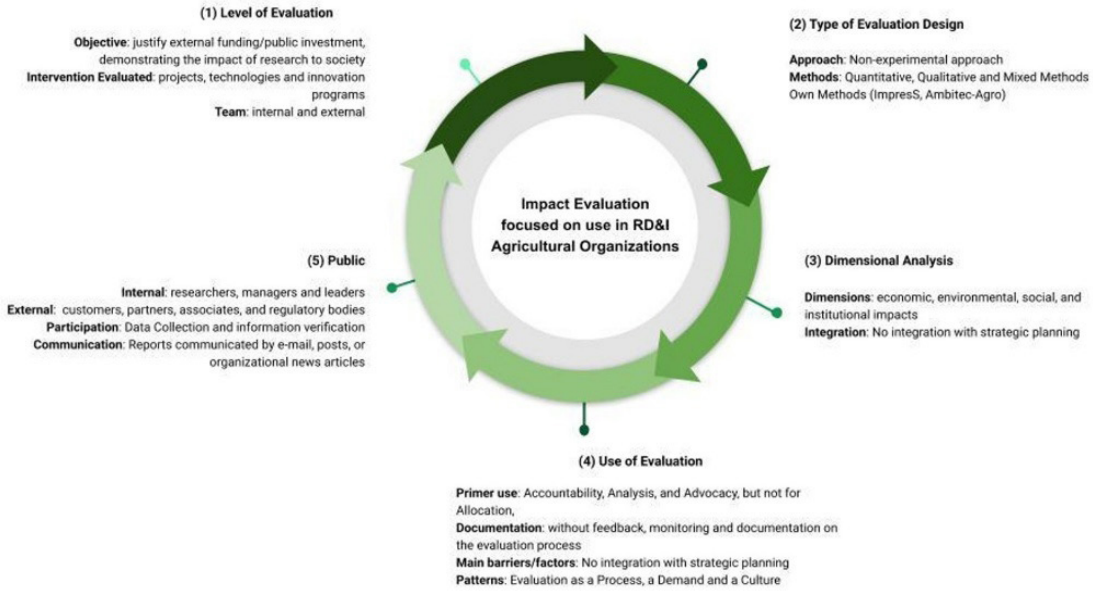

Figure 7. AGRIUM Analysis of the agricultural RD&I evaluation process for enhancing use.
Source: Developed by the authors.

Understanding that the use of evaluation results is shaped by how evaluations are planned and executed, it is crucial, at the (1) Level of Evaluation, to position the organization itself as a

stakeholder in the impacts generated. This allows organizations to assess whether an intervention should be adjusted or replaced. Regarding the (2) Type of Evaluation Design, addressing methodological rigor amid resource constraints requires strengthening Evaluation Capacity Building (ECB), as emphasized by Preskill & Boyle (2008) and Deniston (1980). Moreover, while multidimensional evaluation frameworks have been widely adopted ((3) Dimensional Analysis), their broader scope does not necessarily lead to greater utilization in RD&I, contradicting Horton & Mackay (2003).

This finding reinforces the need for organizations to transition from accountability-driven evaluation models to learning-oriented approaches that enhance strategic decision-making (Joly et al., 2016; Lee et al., 2020). In this regard, leadership validation and recognition are essential (Milzow et al., 2019), requiring strategies that integrate evaluation results into R&D and evaluation team routines. However, our study shows that their adoption remains tied to the evaluation level, serving primarily external accountability purposes rather than fostering internal learning. Although organizational learning emerged as the second most common "A" (Analysis), its promotion is largely driven by evaluation teams, often without structured processes. Establishing a well-defined system – covering information management, documentation, feedback practices, and monitoring recommendations – is crucial, as highlighted by Horton & Mackay (2003). However, such structured approaches were notably absent across all eight organizations studied (4. Use of Evaluation). This absence led to the identification of recurring patterns in how evaluations are conducted and used or not within the organizations.

5.1 Patterns in Agricultural RD&I Evaluations

Our analysis revealed three distinct evaluation patterns: process, demand, and culture. These patterns represent mandatory, demand-driven, or voluntary approaches, differing in their emphasis on internal versus external use and evaluation frequency (Figure 8).

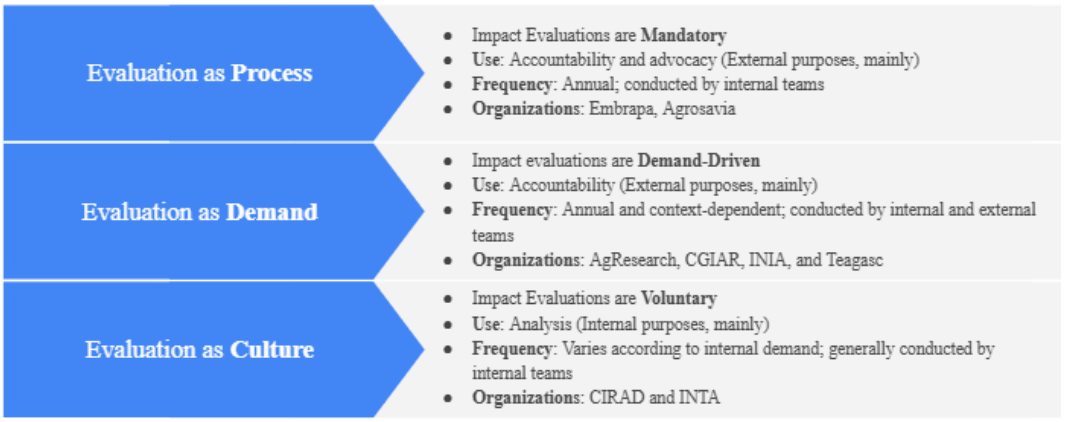

Figure 8. Patterns of Agricultural RD&I Evaluation: Process, Demand, and Culture.
Source: Developed by the authors.

None of the observed patterns alone guarantees effective use by R&D. Therefore, it is expected that these patterns can coexist: a well-established evaluation frequency and a productive process, as observed in the cases of Embrapa and Agrosavia, strengthen teams. On the other hand, *evaluation as a demand* reflects an increasingly prevalent reality, as organizations face growing scrutiny from

regulatory bodies. *Evaluation as a culture*, however, evokes an organizational logic centered on assessment. Based on this, to enhance the use of evaluation results in RD&I, organizations should address the barriers identified in this study by adopting the following strategies:

1. **Integration into Strategic Planning**: Organizations should formalize the integration of evaluation results into decision-making processes, particularly during the proposal formulation stage, aligning evaluations with strategic objectives.
2. **Dynamic Communication Strategies**: Incorporating innovative tools, such as infographics, social media, and interactive dashboards, can improve the dissemination and accessibility of evaluation results.
3. **Stakeholder Engagement**: Expanding the involvement of external stakeholders throughout the evaluation cycle can enhance the legitimacy, relevance, and applicability of results.
4. **Capacity Building**: Strengthening ECB initiatives through targeted training and resources can empower teams to effectively address methodological and practical challenges.

To operationalize these strategies, we recommend that organizations:

- Implement systematic feedback loops, structured documentation processes, and open-access repositories to ensure evaluation results are actively used, revisited, and accessible for institutional learning.
- Institutionalize structured mechanisms that embed evaluation findings into strategic planning and decision-making frameworks.
- Develop internal policies that promote the integration of evaluation results into research agendas, ensuring evaluations move beyond compliance-driven exercises and serve as tools for institutional learning.

Considering these elements, this study offers theoretical, methodological, and practical contributions to the field of evaluation. Theoretically, it identifies structural, operational, and applicability factors that influence the use of evaluation results, expanding existing frameworks in R&D evaluation. Methodologically, the AGRIUM model emerges as an innovative tool for diagnosing and enhancing the utilization of impact evaluations in RD&I organizations. It serves as a mechanism for mobilizing organizations toward the responsible use of resources, aligning with the principles of RRI and RRA.

Eisenhardt's (2021) approach facilitated the construction of analytical syntheses for each AGRIUM vector, contributing to a less explored area of literature, as noted by Pinto & Bin (2024), with potential applications beyond agricultural research. Practically, the study provides actionable recommendations for leaders, RD&I managers, and evaluators to strengthen evaluative processes, promote systematic assessments, and ensure evidence-based decision-making.

Despite these contributions, the study has limitations. The analysis focused on a limited sample of large organizations, potentially overlooking the dynamics of smaller or less formalized entities. Additionally, the perspectives of actors at lower hierarchical levels were not examined, which could provide insights into operational challenges and opportunities. Future research should address these gaps by expanding the scope to include a broader range of organizations and incorporating diverse stakeholder perspectives.

Finally, the findings underscore the urgent need to promote systematic evaluations in agricultural RD&I, particularly in publicly funded research. This is especially relevant for countries like Brazil, where impact evaluations remain primarily linked to accountability rather than institutional learning. Moreover, responsible research and production play a crucial role in addressing the challenges and opportunities in Brazilian agriculture (Pena Junior & Francozo, 2023).

Integrating evaluations throughout the research lifecycle (from proposal formulation to post-implementation) can enhance their strategic value and improve result utilization. Achieving this

requires organizational commitment, adequate resources, and robust information management practices to foster a culture of impact literacy and social responsibility, as advocated by RRI and RRA movements.

A structured approach, such as ToC, already adopted by institutions like CGIAR, can help organizations define causal pathways for integrating evaluation findings into decision-making. While Rogers (2014) and Mayne (2015) emphasize the role of ToC in achieving impact in agricultural research, its alignment with RRI and RRA principles is particularly relevant when considering how evaluation results can drive responsible and transformative change.

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DMP: Conceptualization, Investigation, Methodology, Validation, Visualization, Writing – original draft; Writing - review & editing. AB: Conceptualization, Investigation, Methodology, Supervision, Writing - review & editing.

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Data availability:

The research data are available through GitHub: https://github.com/danimaciel/agrium.

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