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RETHINKING THE FIELD: A NARRATIVE REVIEW OF INTERNATIONAL WORK SAFETY INTERVENTIONS AND LOCAL BEST PRACTICES FOR NEXT-GENERATION FARMERS IN ROMANIA

Mirela STANCIU[1], Mihai-Radu POP[2], Agatha POPESCU[3]

Abstract. ***Contextual background:*** *Agriculture is one of the most dangerous economic sectors worldwide, where traditional top-down training in occupational safety consistently fails to attract and engage the new generation of digital native farmers. To ensure sustainable generational renewal, occupational safety and health (OSH) education in agriculture must move from rigid compliance with regulations to dynamic interventions, capable of changing behaviours and reshaping the cultural habitus of the community.* ***Objective:*** *this mixed-method study synthesizes the global landscape of safety education interventions dedicated to the new generation of farmers, assesses contemporary European benchmarks, and situates these findings in the specific socio-economic context of higher agricultural education in Romania.* ***Methodology:*** *a systematic literature review was conducted in the main academic databases, targeting occupational safety educational interventions, published between 2021 and 2026. The data were triangulated with the communication kits and European good practices identified within the SafeHabitus project (Horizon Europe), covering case studies from various European countries. To validate the international benchmarks at the local level, a co-design workshop based on the design thinking methodology was organized with agronomy students from Romania. Occupational risks were mapped and interventions were outlined for vegetable and livestock farms.* ***Results:*** *the global synthesis reveals a major paradigm shift towards the use of immersive technologies (virtual/augmented reality) and micro-learning. The comparative analysis with the SafeHabitus model highlighted successful European interventions, such as AI-enabled reversing cameras and person detection (Germany), video competitions for young farmers (Finland) and*

[1] Prof., PhD, Eng. Habil., ” Lucian Blaga” University of Sibiu, Romania, Faculty of Agricultural Sciences, Food Industry and Environmental Protection, Associate Member of Academy of Romanian Scientists, (E-mail: mirela.stanciu@ulbsibiu.ro).
[2] Assist. Prof., PhD, Eng. ” Lucian Blaga” University of Sibiu, Romania, Faculty of Agricultural Sciences, Food Industry and Environmental Protection, Romania (E-mail:mihai.pop@ulbsibiu.ro).
[3] Prof., PhD., Eng. Ec., University of Agronomic Sciences & Veterinary Medicine of Bucharest, Romania, Faculty of Management and Rural Economy, Full member of Academy of Romanian Scientists, Corresponding member of the "Gheorghe Ionescu-Sisesti" Academy of Agricultural and Forestry Sciences”, (E-mail: agatha_popescu@yahoo.com)

integrated safety toolkits (Czech Republic). The design thinking workshop organized in Romania aimed to deeply understand the real context of farms (plants and animals), map work risks, identify prevention measures (technical, organizational, behavioural and training) and include these topics in the curricula of the relevant disciplines, with the recommendation of using AI tools for agriculture (Agri-AI), digital stories, etc. ***Conclusions:*** *rethinking education on agricultural safety requires going beyond universal institutional models. To protect the future agricultural workforce, policymakers and universities must integrate co-designed, technology-based, and peer-validated training models that transform occupational safety from a regulatory burden into a core professional value for the next generation of farmers.*

Keywords: occupational safety and health (osh), farm safety culture, safehabitus, agricultural students, educational interventions, behavioural change, narrative review, design thinking

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1. Introduction

Agriculture stands at a critical crossroads, marked by a profound contradiction. While it is celebrated as the cornerstone of global food security and a driver of technological innovation, it remains stubbornly classified as one of the most hazardous economic sectors worldwide [2; 6; 21; 29]. Every year, millions of agricultural workers suffer from severe occupational injuries, chronic illnesses, and fatal accidents, carrying a human and economic toll that surpasses most other industries. The quality of life of farmers is influenced by numerous factors. Occupational stress and isolation directly and proportionally influence their well-being [1].

Generational renewal is crucial for European agriculture [5]. In 2025, the European Congress for Generational Renewal at European Level took place in Poznan (Poland). In this context, agriculture is an essential sector, which produces food and must guarantee environmental and territorial security. Farmers are the depositories of national culture.

Despite decades of regulatory efforts and institutional guidelines, farm-related casualty rates have plateaued rather than plummeted. This persistent stagnation signals a systemic failure: traditional, top-down occupational safety and health (OSH) education is failing to connect with those who need it most.

This educational gap becomes a structural crisis when looking at the next generation of farmers. Generational renewal is vital for the survival of rural economies, yet young farmers and agricultural students are entering a sector that looks vastly different from that of their parents. Today's young farmers navigate an increasingly digitized, highly mechanized, and climate-stressed environment, which requires professional skills adapted to current needs, especially in the context of the decreasing attractiveness of agricultural jobs [3; 10; 13; 20; 24; 30]. They are expected to be tech-savvy entrepreneurs, yet they are often trained using obsolete pedagogical

frameworks rooted in passive, compliance-based learning. Traditional safety lectures and generic manuals fail to trigger actual behavioral change, leaving next-generation agricultural workers exposed to high-risk environments with psychological and behavioral frameworks unsuited for modern farm safety.

To overcome this inertia, international research is undergoing a paradigm shift, moving from static safety instruction toward dynamic, co-designed, and behavior-changing interventions [7]. Central to this global shift is the understanding that safety is not just a set of rules to be memorized, but a cultural habitus—a deeply ingrained set of practices, perceptions, and attitudes. At the forefront of this European movement is the EU Horizon Europe SafeHabitus Project (2022–2026). SafeHabitus focuses on redefining agricultural safety by shifting the focus toward the "habitus" of farming communities, employing multi-actor approaches, Communities of Practice (CoPs), and digital storytelling to foster a sustainable and proactive safety culture from the ground up [4; 7].

However, translating international best practices and European frameworks into national contexts remains a complex challenge, particularly in Eastern European countries like Romania. Romanian agriculture features a unique socio-economic landscape, characterized by a sharp division between small-scale subsistence farms and large, highly technological agricultural enterprises. For Romanian agricultural students—the future managers and operators of these farms—safety education must be localized, engaging, and culturally relevant. To bridge the gap between global frameworks and local realities, this study supplements a comprehensive literature review with a practical, bottom-up approach: a co-design workshop utilizing design thinking methodology conducted with Romanian agricultural students. By engaging students as active creators rather than passive recipients, this workshop aimed to prototype tailored safety communication strategies that resonate with their specific generational and regional needs.

Therefore, this narrative review aims to achieve a dual objective. First, it synthesizes global literature published between 2021 and 2026 to map out international best practices and emerging methodologies in occupational safety education for next-generation farmers. Second, it contextualizes these global trends through the lens of the SafeHabitus project and evaluates how innovative co-design methodologies, such as design thinking, can be successfully deployed to reshape safety culture among young agricultural professionals in Romania. Ultimately, this paper argues for a fundamental "rethinking of the field," demonstrating that protecting the future agricultural workforce requires moving beyond regulatory compliance and toward collaborative, technology-driven, and student-centred safety education.

2. Materials and Methods

To provide a comprehensive and actionable framework for next-generation agricultural safety, this study employs a mixed-methodological approach. It integrates a systematic literature search of global educational interventions, an analysis of contemporary European communication models from the Horizon Europe SafeHabitus Project, and primary qualitative data gathered from a localized co-design workshop with Romanian agricultural students. By combining macro-level global trends with micro-level student insights, this methodology ensures both academic rigor and practical relevance.

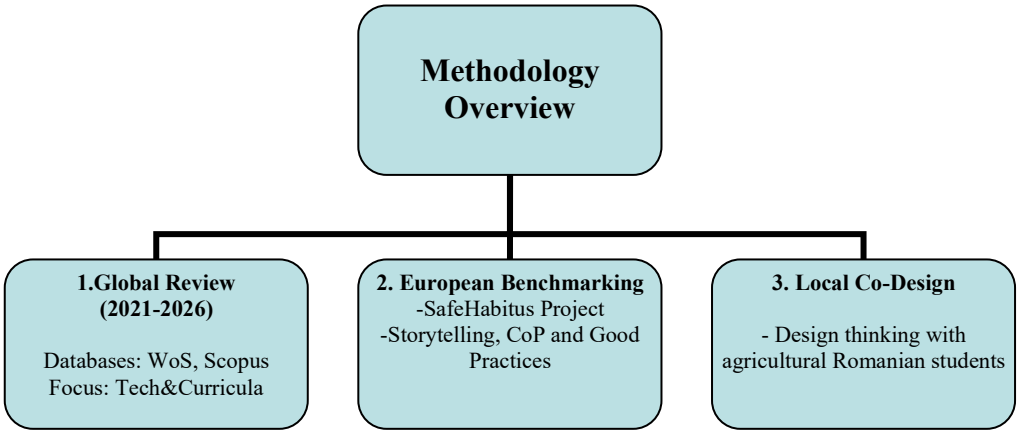


Figure 1. Research methodology

2.1. Literature Search Strategy (2021–2026)

A systematic literature search was conducted to map the global landscape of occupational safety education tailored for the next generation of farmers.

Databases & Timeline: Searches were executed across Web of Science and Scopus, restricting results to peer-reviewed articles, review papers, and conference proceedings published between January 2021 and December 2026.

Search Strings: Keywords and Boolean operators included combinations of: *("agricultural education" OR "safety training" OR "OSH intervention") AND ("young farmers" OR "next-generation" OR "agricultural students") AND ("injury prevention" OR "safety culture")*.

Inclusion/Exclusion Criteria: Studies were included if they explicitly evaluated educational or communicative interventions aimed at farmers under 40, vocational students, or youth in rural environments. General agricultural safety papers lacking a distinct generational, educational, or technological intervention focus were excluded.

2.2. The SafeHabitus Framework Analysis

To anchor the global literature within current European policy and research trajectories, this review analyzes data, communication toolkits, and milestone reports generated by the EU Horizon Europe SafeHabitus Project (2022–2026).

Focus of Analysis: The analysis specifically evaluated the project's multi-actor approach, focusing on how regional Communities of Practice (CoPs) function as facilitators for behavioral change (*shifting the habitus*).
Data Extraction: Special attention was given to the efficiency of digital storytelling—such as testimonial videos and peer-led narrative campaigns featuring farm accident survivors—as a pedagogical tool to trigger emotional resonance and risk awareness among younger demographics. The best practice models identified in the countries participating in the project were also analyzed.

2.3. Co-Design Workshop Design: A Multi-Sectorial Design Thinking Approach

To validate international findings within a specific local context, a hands-on co-design workshop was conducted with Romanian agricultural students (21 Avril 2026). The primary objective was to identify sector-specific occupational risks across the distinct farming types (vegetable and livestock farms) —and to identify user-centric educational interventions capable of mitigating these hazards.
In this initial phase, students stepped into the shoes of farm workers and managers to understand their daily routines, psychological pressures, and physical environments. Vegetable Farms Group: Analyzed the routines of workers dealing with intense seasonal pressures, repetitive manual tasks, and chemical exposure (pesticides/fertilizers). They mapped out the "day-in-the-life" of a tractor operator and a greenhouse worker. Livestock Farms Group: Focused on the unpredictability of animal behavior, large livestock handling, and prolonged exposure to biohazards (zoonotic diseases, dust, gases like ammonia).
During the brainstorming session, students shifted from problem-mapping to solution-generation. Moving away from traditional regulatory manuals, they prioritized communication and education channels that resonate with Gen Z and millennial farmers. Ideas were filtered based on feasibility, cost-effectiveness, and potential for behavioral change (*shifting the habitus*).
The identified prevention measures (technical, organizational, behavioral and training) for the 2 types of farms were also based on their practical experience from the family farms they come from. The possibility of including the identified risks and prevention measures in the subject of specialty discipline sheets was analyzed, with an emphasis on the use of AI tools for agriculture (Agri-AI), digital stories and digital technology.

3. Results and Disscutions

3.1. Global Trends in Next-Gen Agricultural Safety Education

The global agricultural sector is undergoing a profound transformation driven by automation, precision farming, and generational turnover. Consequently, the literature published between 2021 and 2026 reveals that traditional, passive safety training methods—such as lectures, textbook reading, and static safety signs—are rapidly losing relevance. To engage a generation of digitally native farmers (Gen Z and Millennials), international safety interventions have pivoted toward experiential learning, digital integration, and proactive behavioral design. This chapter synthesizes these global trends, focusing on technological innovations and the restructuring of formal and informal educational frameworks.

3.1.1. Technological and Digital Interventions

The integration of Industry 4.0 technologies into agricultural practices [16; 33], and in safety training [34] represents the most significant trend in recent years. Rather than treating safety as an abstract concept, modern interventions leverage immersive technology to simulate high-risk environments without exposing young farmers to actual physical danger.

Virtual Reality (VR) and Immersive Simulations: Between 2021 and 2026, VR has emerged as a gold standard for heavy machinery training. Studies from North America and Western Europe demonstrate that VR simulations of tractor rollovers, Power Take-Off (PTO) entanglement, and blind-spot navigation significantly improve hazard recognition. Young farmers trained via VR exhibit faster reaction times and better risk-mitigation decisions in real-world scenarios compared to those trained via traditional slideshows [25].

Digital Gamification and Mobile Micro-Learning: Recognizing the short attention spans and mobile-first habits of the next generation, researchers have increasingly developed gamified safety applications [14; 23]. These interventions break down complex occupational safety and health (OSH) regulations into "bite-sized" challenges, quizzes, and rewards. Micro-learning modules [32] delivered via smartphones allow young workers to access safety protocols directly in the field—such as quick-response (QR) codes attached to chemical storage units that trigger short, animated safety videos.

Augmented Reality (AR) on the Farm: Emerging literature highlights the use of AR to overlay real-time safety hazard data onto physical equipment [15]. For instance, using smart glasses or mobile screens, agricultural students can view safe operational angles while driving machinery on slopes or receive immediate visual alerts regarding missing protective guards.

3.1.2. Formal vs. Informal Curricula: Shifting from Compliance to Culture

Beyond technology, global trends indicate a systemic shift in *how* and *when* safety education is delivered (Table 1). The literature emphasizes that waiting until an individual becomes an adult farm operator is often too late to alter deeply ingrained, risky habits.

Table 1 Where and when is farm safety training delivered?

Educational Dimension	Traditional Aproach (pre 2021)	Modern Global Trends (2021-2026)
Primary Focus	Regulatory compliance & legal leability	Proactiv risk culture & behavioural change
Delivery Method	Sporadic, isolated safety seminars	Continuous integration into core agricultural curricula
Target Audience	Adults farmers owners and operators	Agricultural students rural youth, and family members
Pedagogy	Top-down institutional guidelines	Peer-to-peer monitoring and active co-design

Source: designed base on literature

3.1.3. Mainstreaming OSH into Higher and Vocational Education:

A critical trend is the embedding of OSH directly into core agronomy, engineering, and business curricula in agricultural universities. Instead of safety being an isolated, one-off seminar, it is treated as an essential component of professional operational excellence. Global data shows that institutions incorporating safety into daily laboratory and field exercises produce graduates who inherently prioritize risk assessment in their future managerial roles.

3.1.4. Informal Peer-Led and Community-Driven Programs:

Formal schooling alone is insufficient, especially in family-farming ecosystems where informal training dominates. Recent interventions leverage peer-led networks, social media campaigns (e.g., safety challenges on TikTok or Instagram), and rural youth organizations (such as 4-H in the US [22] or Macra na Feirme in Ireland [18]. These programs utilize the social dynamics of young communities to de-stigmatize the use of personal protective equipment (PPE) and challenge the traditional "macho" culture of agriculture that often associates risk-taking with professional competence.

In conclusion, the global landscape between 2021 and 2026 highlights that the most successful safety interventions for the next generation are interactive, digitally enhanced, and culturally integrated. However, a major gap identified in the global literature is the lack of localization—many advanced technological

tools are designed for high-income countries, leaving a critical need to adapt these trends to specific regional contexts, such as Eastern Europe.

3.2. European Benchmarks: The SafeHabitus Approach

While global trends highlight the rapid evolution of digital and pedagogical tools, implementing these innovations within the complex socio-economic fabric of European agriculture requires a structured, multi-actor framework. Between 2022 and 2026, the EU Horizon Europe SafeHabitus Project has emerged as the definitive benchmark for rethinking agricultural safety across the European Union [26]. Moving beyond traditional regulatory enforcement, SafeHabitus targets the underlying social and cultural determinants of risk-taking [27]. This chapter explores how this European initiative operationalizes behavioral change and shapes peer-to-peer communication models tailored for the next generation of farmers.

3.2.1. Shifting the Habitus: From Risk Acceptance to Proactive Safety

The core philosophy of the **SafeHabitus project** is that farm safety cannot be achieved by top-down decrees alone; it requires transforming the subconscious, deeply ingrained cultural habits of farming communities [21; 26]. Historically, the agricultural "habitus" has normalized high-risk behaviors, equating unsafe practices with professional endurance, experience, or economic efficiency.

The Multi-Actor Approach: SafeHabitus disrupts this paradigm by bringing together researchers, farmers, farm advisory services, trade unions, and agricultural students [26]. This ensures that safety interventions are not designed in academic isolation but are co-created with the end-users who understand the practical realities of daily farm work.

Communities of Practice (CoPs): A cornerstone of the project's success is the deployment of regional **Communities of Practice (CoPs)** across various EU member states [27]. These CoPs act as localized multi-stakeholder hubs where young farmers, students and, various stakeholders can openly discuss "near-misses," identify hazardous blind spots in their specific regions, and collaboratively design practical, everyday safety solutions. This shifts the perception of safety from an external regulatory burden into a self-imposed, peer-validated professional standard.

3.2.2. Peer-to-Peer Networks and Digital Storytelling

The SafeHabitus project recognizes that traditional, text-heavy safety brochures carry little weight with next-generation farmers [26]. Consequently, the initiative has pioneered communication models driven by emotional resonance, digital media, and horizontal peer influence.

Digital Storytelling: One of the most effective interventions validated by SafeHabitus is the use of **digital storytelling** [7]. This methodology involves producing high-impact, short-form video testimonials featuring farm accident survivors, injured workers, or young farmers who experienced life-altering near-misses. Unlike statistical data or dry manuals, these narratives generate deep emotional engagement among agricultural students, breaking through the youthful illusion of invulnerability.

Horizontal Communication via Social Media: By leveraging peer-to-peer networks, SafeHabitus bypasses traditional top-down institutional messaging [27]. Young farmers within the CoPs share these digital stories and micro-learning safety tips through localized social media networks (e.g., WhatsApp groups, TikTok, and Instagram). When a young peer validates a safe practice—such as always checking the PTO shaft shield or wearing proper respiratory masks in dusty silos—it carries significantly higher credibility and social acceptance than an institutional warning.

In summary, the SafeHabitus project provides a powerful European blueprint showing that effective safety education must be **participatory, emotionally engaging, and peer-driven** [7]. However, the successful adoption of this model across diverse EU regions relies heavily on local contextualization. This sets the stage for analyzing how these European benchmarks translate into the specific realities of higher agricultural education in Eastern Europe.

3.2.3. Best practices at the international level

The SafeHabitus Project has developed an infographic, structured around six main pillars of European good practices for farm safety (Table 2).

Table 2 Main pillars of European good practices for farm safety

Pillars	Good Practices Examples
1. Awareness Raising	**AgriKids™ (Ireland):** Targeted initiatives to increase farm safety risk awareness specifically among children.
	Young Farmer Safety Video Contest (Finland): Engaging media competitions focused on protecting farmers, workers, and livestock.
	Podcasts & Blogs (Slovakia): Leveraging modern digital media channels to dynamically change traditional farm safety culture.
	Transforming a Dairy Farm (Estonia): Pilot projects demonstrating the intersection between farmer quality of life and business viability.
2. Advisory Service	**Certified Farm Safety Advisors (Lithuania):** Embedding certified occupational safety experts directly into existing agricultural advisory services.
3. Education and Training	**Early Education (Poland):** Farm safety education programs tailored for children and rural youth.
	Complete Farm Safety Toolkit (Czech Republic): Comprehensive

	packages including integrated training, campaigns, competitions, checklists, and personal protective equipment (PPE).
	Workforce & Livestock Protection (Slovakia): Educational programs designed to protect farmers, workers, and animals simultaneously.
	Train-the-Trainer for Tractor Safety (Ireland/Italy): Building peer networks of trainers to rapidly scale and share machinery safety knowledge.
	Subsidized Driver Safety Training (Belgium): Providing affordable courses for safer operating and driving of heavy farm vehicles.
4. Technical Improvement	**Retrofitting Old Tractor Steps (Germany):** Practical and low-cost technical adjustments to prevent slips, trips, and fall injuries from older machinery.
	AI Reversing Cameras with Person Detection (Poland): Utilizing artificial intelligence-driven computer vision to detect bystanders and prevent child accidents around heavy vehicles.
5. Action Plan	**Farm Machinery Safety Action Plan (Spain):** Strategic improvements encompassing everything from preventative maintenance to operator training.
	Accident Prevention Through Maintenance (Sweden): Concrete action plans focused on the structured maintenance of machinery, tools, and farm buildings.
6. Risk Management	**Farm Risk Assessment - DUERP (France):** A formalized legal requirement for all operating farms to conduct structured risk assessments.

Soruce: design by SaheHabitus livrables [28]

3.3. Localizing the Solutions: Insights from the Romanian Student Workshop

While the European benchmarks identified by the SafeHabitus project offer robust frameworks, their success depends on successful localization. To bridge the gap between European macro-policies and the micro-level realities of Eastern Europe, this chapter presents the qualitative results of the design thinking (DT) co-design workshop conducted with Romanian agricultural students.

Filho et al (2024) shows that DT is used to promote skills, knowledge and pedagogical approaches, with a focus on integrating sustainability principles [8].

The findings are structured by farm type—vegetable or livestock—highlighting how local youth perceive occupational risks and how they prototype targeted interventions by adapting international best practices.

Students analyzing the vegetable sector focused heavily on the seasonal intensity of crop production, high-stress harvest windows, and long hours operating machinery. Identified Risks: The primary hazards identified were tractor rollovers on uneven terrain, Power Take-Off (PTO) shaft entanglement due to missing protective shields, and acute chemical exposure during pesticide spraying. Visual communication for safety at work with agricultural machinery uses various standardized pictograms, without them being effective for all users [11; 12].

Students noted that in Romania, the coexistence of aging machinery alongside modern, computer-driven tractors creates a dual safety challenge.
The group assigned to animal production explored the volatile nature of livestock handling and the specific biohazards present in modern and traditional barns. Identified Risks: Key risks included crushing, kicking, or pinning injuries inflicted by large livestock (bovine and equine), respiratory disorders caused by prolonged inhalation of dust and ammonia gases in poorly ventilated spaces, and needle-stick injuries during mass veterinary interventions.
Furthermore, localized evidence from Romanian sheep husbandry indicates that pastoral workforces suffer heavily from excessive hours, lack of school-based safety education, and unique musculoskeletal vulnerabilities related to lifestyle and arduous conditions [31].
During three hours, students participating in the workshop debated the real context of farms (vegetables and animals), identified the main categories of work risks (by technological links), identified prevention measures (technical, organizational, behavioral and training). The young people argued for the need to include these topics in the syllabi of the relevant disciplines and proposed the use of AI tools for agriculture (Agri-AI), digital stories and telephone applications.
Agricultural practices that emphasize technology and innovative applications, such as digital agriculture and precision agriculture, represent a form of attraction for young farmers [17].
Design Thinking transforms young people from passive recipients into architects of their own safety. The current generation (Gen Z) rejects rigid guidelines; by involving them in the design thinking process we ensured that the resulting solutions could be on the channel and in the format they use daily.

Cross-Analysis: Gen Z Preferences vs. Institutional Frameworks

The workshop revealed a profound disconnect between how traditional Romanian regulatory frameworks communicate safety and how the next generation of agricultural professionals consumes information (Table 3).

Table 3 Benchmark alignment of information on farm safety

Dimension	Romanian Regulatory Norms (Traditional)	Workshop Insight	Benchmarkt Alignment
Medium	text- heavy manuals, physical sign sheets	smartphone, short videos	podcasts, blogs, video contents
Tone	punitive, compliance - driven, rigide	peer-driven, gamified, narrative based	digital storytelling, CoPs
Focus	post-accident liability allocation	pre-task micro-learning, and habit shift	active risk management

Source: own design

The insights generated from the Romanian design thinking workshop prove that next-generation agricultural workers do not lack safety awareness; rather, they lack **interactive, accessible, and culturally synchronized training tools**. By co-designing solutions that utilize micro-learning, gamification, and peer validation, these students successfully demonstrated how European best practices can be converted into viable, low-cost local interventions.

4. Conclusions

Protecting the future of agriculture requires an immediate and fundamental "rethinking of the field" regarding occupational safety and health (OSH) education. This study has demonstrated that while agriculture remains one of the world's most hazardous sectors, traditional, top-down regulatory frameworks fail to trigger genuine behavioural change among next-generation farmers. The synthesis of global literature (2021–2026) highlights a universal shift toward immersive technologies, digital gamification, and experiential learning. By integrating the pioneering European models developed within the SafeHabitus Project, this paper illustrates that safety must be cultivated as a social *habitus*—a peer-validated, deeply ingrained cultural value—rather than a passive bureaucratic obligation.

The co-design workshop conducted with Romanian agricultural students successfully localized these global trends. The co-creation workshop held with Romanian students in the agricultural field successfully adapted these global trends to the local context. Faced with the specific risks inherent in vegetable farming and livestock-rearing ecosystems, the students did not devise rigid sets of rules; instead, they emphasized the need for user-centric digital solutions—such as AI-based agricultural tools, storytelling techniques, and mobile applications—tailored to the information ecosystem of Generation Z and Millennials. Ultimately, this narrative analysis demonstrates that future farmers are not indifferent to professional risks. On the contrary, they require multimodal educational frameworks—leveraging technology and peer-led facilitation—that align with their advanced digital skills.

Bridging the gap between European benchmarks and local agro-economic realities is the only way to ensure a secure and sustainable generational renewal within rural economies.. Ultimately, this narrative review proves that next-generation farmers are not indifferent to occupational risks. Rather, they require multi-modal, tech-driven, and peer-led educational frameworks that align with their digital fluency. Bridging the gap between advanced European benchmarks and local agro-economic realities is the only pathway to ensuring a safe, sustainable generational renewal in rural economies.

Policy Recommendations: To successfully translate these research insights into tangible systemic changes, policy-makers, educational institutions, and

agricultural stakeholders in Romania and broader Eastern Europe should implement the following targeted actions:

1. **Modernize Vocational and Higher Agricultural Curricula:** Educational institutions must move away from isolated, theory-heavy OSH seminars. Universities and agricultural high schools should embed safety training directly into core practical modules (e.g., agronomy, agricultural engineering). Thus, preparing students for OSH must be a core competency in all agricultural education programs, and be based on practical training. [9; 19]. Traditional lectures should be replaced or augmented with hands-on, high-impact experiential learning tools, such as the peer-designed Virtual Reality livestock simulators or Augmented Reality machinery checklists.
2. **Institutionalize "Train-the-Trainer" and Peer-Led Networks:** Drawing inspiration from the *SafeHabitus Communities of Practice (CoPs)* and *Irish-Italian tractor safety frameworks*, national labour inspectorates and agricultural ministries should fund peer-led safety networks [26, 27, 28]. Training senior agricultural students and young farmers to become certified safety mentors creates a horizontal, highly credible communication channel that effectively de-stigmatizes safety protocols within rural youth communities.
3. **Launch National Digital Storytelling and Micro-Learning Campaigns:** Government bodies, in collaboration with agricultural associations, should sponsor digital media campaigns modeled after the *Finnish young farmer video contests* and *Slovakian safety blogs* [7; 28]. Funding should be directed toward developing short-form, localized video content—featuring real-life near-miss testimonials from accident survivors—and deploying automated micro-learning bots (via platforms like WhatsApp or TikTok) to deliver context-aware safety alerts directly to young farmers' smartphones during peak operational seasons.
4. **Subsidize Safety Tech Adaptations for Small-Scale and Family Farms:** To combat the severe dual-economy divide in Romanian agriculture, policy-makers should introduce dedicated European or national subsidies. These financial grants should help small-scale family operations and younger start-up farmers adopt low-cost, high-impact technological upgrades, such as tractor step retrofitting kits or AI-driven reversing cameras, ensuring that advanced safety technology does not remain an exclusive privilege of large-scale corporate enterprises.

Limitations of the Study

As a narrative review supplemented by a singular co-design workshop, this study has inherent limitations. The qualitative insights are derived from a specific cohort

of university agronomical students, who may possess higher digital literacy and baseline safety awareness than the broader population of rural youth or vocational school students in Romania. Future research should focus on conducting empirical, longitudinal studies to effiiciency of digital applications when deployed across diverse, real-world commercial and family farms over multi-year periods.

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