

Analysis of The Swiss Court Decision on The Rejection of AI as An Inventor in International Patent Law

Valencia Sabel Nastasya¹, Budi Santoso²

^{1,2}Master of Law, Faculty of Law, Universitas Diponegoro

ABSTRACT: The rapid advancement of artificial intelligence (AI) has created new challenges for intellectual property regimes, particularly in the field of patent law. One of the most debated issues is whether AI systems can be legally recognized as inventors. The Swiss Federal Administrative Court recently addressed this matter by ruling that only natural persons may be identified as inventors in patent applications, thereby rejecting the notion of AI inventorship. This decision reflects a strict interpretation of existing legal frameworks, which historically link inventorship to human creativity and accountability. The ruling not only aligns with similar judicial outcomes in jurisdictions such as the United States, the United Kingdom, and the European Patent Office, but also reinforces the global tendency to prioritize human inventors over autonomous systems. This article analyzes the Swiss decision by examining its legal reasoning, its implications for international patent law, and its impact on innovation policy. The case highlights the tension between traditional legal concepts and technological realities, raising questions about how patent systems should evolve to accommodate AI-driven inventions. Ultimately, the Swiss ruling underscores the urgent need for international harmonization and legislative reform in addressing the role of AI within intellectual property law.

KEYWORDS: Artificial Intelligence, Patent Law, Inventorship

INTRODUCTION

The intersection between artificial intelligence (AI) and intellectual property (IP) has emerged as one of the most significant legal debates in the 21st century. The increasing capability of AI to autonomously generate innovative solutions and technical inventions challenges the very foundations of patent law, particularly the notion of inventorship. Patent law, as traditionally constructed, presupposes a human inventor—an individual who conceives of an idea and reduces it to practice through personal creativity, skill, and labor (Wadlow, 2019). However, AI systems such as DABUS, an artificial intelligence program developed by Stephen Thaler, have demonstrated the ability to generate patentable inventions without direct human intervention (Abbott, 2020). This development raises pressing legal questions: can AI be recognized as an inventor, and if not, how should inventions generated by AI be protected within the international patent regime?

In June 2025, the Swiss Federal Administrative Court issued a landmark decision that directly addressed this issue. The court concluded that only natural persons can be designated as inventors under Swiss patent law, rejecting Thaler's attempt to name DABUS as the inventor on his applications. The ruling clarified that the Patent Act in Switzerland is constructed on the principle that inventorship requires a human being, not an artificial system (Swiss Federal Administrative Court, 2025). This decision reflects the persistence of anthropocentric legal reasoning within patent systems, which remain grounded in the premise of human creativity, accountability, and moral rights. Importantly, the Swiss ruling aligns with similar judicial outcomes in other jurisdictions, including the United States (USPTO v. Thaler, 2020), the United Kingdom (Thaler v. Comptroller-General of Patents, 2021), and the European Patent Office (EPO, 2020), all of which rejected AI inventorship on comparable legal grounds.

The ruling has broader implications for international patent law. Intellectual property regimes are shaped not only by domestic legislation but also by international treaties such as the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) and the European Patent Convention (EPC). These frameworks were drafted at a time when AI was not a major consideration, and thus they do not explicitly address the question of non-human inventors. As a result, courts and patent offices have relied on traditional interpretations, reinforcing the legal orthodoxy that only human inventors can be recognized (Rimmer, 2022). The Swiss decision therefore contributes to the growing body of international jurisprudence that resists extending inventorship to AI.

The rationale behind rejecting AI as an inventor is multifaceted. First, patent law connects inventorship with accountability. Inventors are not only entitled to rights but also subject to obligations, such as the duty of disclosure and compliance with good faith (Derclaye, 2018). Since AI lacks legal personhood, it cannot assume legal responsibilities or be held accountable for misconduct. Second, the recognition of AI as an inventor could destabilize existing principles of ownership. If an AI were named

Analysis of The Swiss Court Decision on The Rejection of AI as An Inventor in International Patent Law

as the inventor, the chain of title leading to patent ownership would become legally uncertain, since ownership traditionally derives from the inventor (Calboli, 2021). Third, the refusal to recognize AI inventorship is rooted in the moral and philosophical foundation of intellectual property law, which is grounded in the labor and creativity of human beings. Granting inventorship to AI could dilute the very meaning of innovation and disrupt the incentive structures that underpin the patent system (Yu, 2021).

Nevertheless, the Swiss case also exposes tensions within the international IP framework. While courts emphasize the human-centered nature of inventorship, technological reality demonstrates that AI is increasingly involved in the inventive process. Scholars have noted that AI is already being deployed in drug discovery, material science, and engineering design, producing results that surpass human capabilities in speed and complexity (Cockburn et al., 2018). The inability of legal systems to adequately address these developments risks creating gaps in protection, where AI-generated inventions might fall outside the scope of patent law altogether. Such gaps could undermine innovation policy, as businesses and researchers may lack sufficient incentives to invest in AI-driven research (Gervais, 2020).

The international nature of the debate adds another layer of complexity. While the Swiss decision is domestically binding, it resonates globally as part of a broader jurisprudential trend. Jurisdictions that reject AI inventorship are effectively shaping the future direction of international patent law. Yet, not all countries are aligned. For instance, South Africa granted a patent naming DABUS as the inventor in 2021, becoming the first jurisdiction to formally recognize AI inventorship (de Beer, 2021). Australia initially followed a similar path when its Federal Court recognized AI inventorship in 2021, though this decision was later overturned on appeal (Thaler v Commissioner of Patents, 2022). These divergent approaches highlight the lack of international consensus and the urgent need for harmonization.

From a policy perspective, the Swiss ruling underscores the need for legislative reform. Existing statutes were drafted for a pre-AI era, and courts are constrained by textual interpretation. Legislators, however, have the capacity to adapt the law to emerging realities. Options for reform include recognizing AI as a co-inventor alongside human contributors, creating sui generis protection regimes for AI-generated inventions, or clarifying ownership rules to ensure that the benefits of AI-driven innovation flow to humans or organizations that deploy and control the AI (Drahos, 2022). Each of these options carries advantages and risks. Recognizing AI as a co-inventor could provide legal clarity but may raise philosophical objections. Sui generis protection could prevent legal uncertainty but might fragment the international IP landscape.

In conclusion, the Swiss court's decision represents a critical contribution to the ongoing debate on AI inventorship in international patent law. It reaffirms the human-centered nature of current legal frameworks while simultaneously exposing their limitations in addressing technological change. As AI continues to advance, pressure will mount on lawmakers and international organizations to update patent regimes to reflect the realities of innovation in the digital age. This introduction sets the stage for a deeper analysis of the Swiss decision, its doctrinal foundations, and its implications for the future of global IP law.

FORMULATION OF THE PROBLEM

1. What are the legal considerations of the Swiss Federal Administrative Court in rejecting the recognition of Artificial Intelligence as an inventor under patent law?
2. What are the implications of this decision for the development of international patent law and the efforts toward harmonizing inventorship in the context of AI?

RESEARCH METHOD

This study employs a qualitative legal research method with a doctrinal approach, focusing on the interpretation and analysis of laws, judicial decisions, and international treaties relevant to intellectual property. Doctrinal research is appropriate in this context because the central issue concerns the legal recognition of artificial intelligence (AI) as an inventor within patent systems, which requires an examination of statutory language, case law, and legal principles (Hutchinson, 2017). The research begins with a close reading of the Swiss Federal Administrative Court decision (2025) rejecting AI as an inventor, situating the case within the broader framework of Swiss Patent Law. Comparative analysis is then undertaken by examining similar decisions from the United States

(USPTO v. Thaler, 2020), the United Kingdom (Thaler v. Comptroller-General of Patents, 2021), and the European Patent Office (EPO, 2020). This comparative dimension provides insight into the degree of international convergence and divergence on the issue of AI inventorship (Ziegler, 2022). In addition, international treaties such as the TRIPS Agreement and the European Patent Convention (EPC) are analyzed to identify whether current global IP instruments accommodate or exclude the possibility of AI inventorship. Secondary sources, including academic literature, policy papers, and scholarly commentary, are used to contextualize the legal debate and highlight emerging policy options (Gervais, 2020; Rimmer, 2022). By synthesizing these sources, the research aims to construct a comprehensive understanding of the legal reasoning underlying the Swiss ruling and its implications for international patent law. The ultimate goal is to provide normative insights into how patent regimes may evolve to address the challenges posed by AI-generated inventions.

DISCUSSION

A. Legal Considerations of the Swiss Federal Administrative Court in Rejecting AI as an Inventor under Patent Law

The emergence of generative artificial intelligence has created one of the most complex and controversial challenges in modern copyright law. At the core of this debate lies the question of whether the use of copyrighted material to train AI systems constitutes unlawful reproduction or whether it can be considered a transformative practice permitted under existing legal doctrines. The dispute between Getty Images and Stability AI provides a crucial lens through which to examine these issues. Getty Images, as one of the largest providers of stock photographs in the world, alleges that Stability AI copied millions of its images without permission in order to train the Stable Diffusion model. The company further claims that the presence of distorted versions of its watermark in AI-generated images provides clear evidence of unauthorized reproduction. Stability AI, in response, insists that its model does not memorize or reproduce copyrighted works but rather learns statistical correlations and patterns that allow it to create new images. This clash not only tests the boundaries of copyright law but also raises broader questions about derivative works, originality, and the impact of artificial creativity on established markets.

The decision of the Swiss Federal Administrative Court in June 2025 regarding the rejection of Artificial Intelligence (AI) as an inventor represents a crucial development in international patent jurisprudence. The case emerged from an application filed by Stephen Thaler, who attempted to designate his AI system DABUS as the inventor on a patent application. This attempt was part of a broader international strategy pursued by Thaler in multiple jurisdictions, including the United States, the United Kingdom, the European Patent Office, South Africa, and Australia. The Swiss court's decision is significant not only because it reaffirms the traditional human-centered understanding of inventorship, but also because it articulates a set of legal considerations that reveal the structural and conceptual foundations of patent law in the age of artificial intelligence.

At the heart of the Swiss judgment lies the interpretation of statutory provisions under the Swiss Patent Act. The court emphasized that the language of the statute presupposes a natural person as inventor. Provisions concerning rights of inventors, transfers of entitlement, and moral rights are consistently framed in terms that assume human agency. The absence of any reference to machines or autonomous systems was taken as conclusive evidence that the legislature intended inventorship to remain limited to natural persons. The court further underscored that it could not expand the meaning of "inventor" beyond the statutory framework, since such a step would constitute judicial law-making. This reveals a doctrinal fidelity to legislative supremacy, characteristic of civil law traditions, in which courts apply the law as written and refrain from creating new legal norms in the absence of statutory authorization. Consequently, the Swiss judges stressed that any reform concerning AI inventorship must be the task of the legislature rather than the judiciary.

The court's decision also rests upon the conceptual foundations of inventorship. Patent law, historically and philosophically, is premised on the recognition of human creativity. The figure of the inventor is not merely a technical designation but a symbol of intellectual contribution, innovation, and personal ingenuity. The Swiss judgment reaffirmed this human-centered view, insisting that while AI systems may generate outputs that appear inventive, they do so through computational processes rather than acts of creativity in the human sense. Machines lack intentionality, consciousness, and moral responsibility. By refusing to extend inventorship to AI, the court preserved the conceptual coherence of patent law, which is grounded in the recognition of human intellectual labor as the source of entitlement to exclusive rights.

Another central consideration in the ruling is accountability. Inventors in patent law are not only beneficiaries of rights but also bearers of obligations. They must disclose the invention fully, comply with procedural requirements, and may face consequences if they act fraudulently or in bad faith. Since AI lacks legal personhood, it cannot assume legal duties or be held liable for misconduct. Recognizing AI as an inventor would therefore generate a legal vacuum, as there would be no subject to bear responsibility for the obligations tied to inventorship. This reasoning is consistent with broader principles of law, which predicate rights upon duties and accountability. The absence of legal personality in AI underscores the incompatibility between machine inventorship and the structure of patent law as it currently exists.

The decision also paid close attention to ownership and the chain of title. In most legal systems, the inventor is the original owner of the patent, and rights can subsequently be assigned to employers, assignees, or third parties. If AI were recognized as the inventor, this chain of entitlement would be disrupted, since AI cannot exercise ownership rights or transfer them to another party. The uncertainty created by such a situation could destabilize the patent system, undermine predictability in commercial transactions, and invite disputes over entitlement. The Swiss court therefore concluded that preserving inventorship for natural persons was essential to maintaining stability in ownership rules and ensuring the smooth functioning of patent law.

International consistency was another major consideration. Patent law does not operate in isolation but within a global framework shaped by treaties such as TRIPS and the European Patent Convention. These instruments, though drafted before the advent of AI inventorship debates, implicitly assume that inventors are human. By aligning with the positions adopted by the United States, the United Kingdom, and the European Patent Office, the Swiss court contributed to the emerging international consensus that rejects AI inventorship. Such harmonization enhances predictability for multinational applicants and avoids the fragmentation that could arise if different jurisdictions adopted conflicting approaches. While countries such as South Africa and, briefly, Australia have experimented with recognizing AI as an inventor, the dominant trend remains firmly opposed to such recognition. The Swiss

Analysis of The Swiss Court Decision on The Rejection of AI as An Inventor in International Patent Law

judgment thus reinforces the prevailing orthodoxy and contributes to the shaping of global jurisprudence.

The reasoning of the Swiss court also reflects an awareness of the broader philosophical and policy debates surrounding AI and intellectual property. By denying AI inventorship, the court implicitly reaffirmed the incentive theory of patent law, which holds that exclusive rights are granted to stimulate human creativity and investment. If AI were recognized as an inventor, this incentive structure might be undermined, since machines require no incentives to innovate. At the same time, the ruling highlights a growing tension between legal doctrine and technological reality. AI systems are increasingly involved in the inventive process, producing outcomes that surpass human capabilities in speed, scale, and complexity. The refusal to recognize AI inventorship may create gaps in legal protection for AI-generated inventions, potentially discouraging investment in AI-driven research. Yet, the court maintained that such policy issues fall within the realm of legislative reform rather than judicial adjudication.

In sum, the Swiss Federal Administrative Court's rejection of AI as an inventor was based on a multifaceted set of legal considerations. These included the textual interpretation of the Swiss Patent Act, the doctrinal understanding of inventorship as inherently human, the principle of accountability tied to legal personhood, the stability of ownership and chain of title, and the importance of international consistency. The decision reflects both fidelity to the letter of the law and sensitivity to the structural integrity of patent systems. While the court acknowledged the challenges posed by AI to traditional legal frameworks, it insisted that addressing those challenges requires deliberate legislative reform at both domestic and international levels. The ruling therefore not only reinforces the current orthodoxy but also signals the urgency of rethinking the future of patent law in an era increasingly shaped by artificial intelligence.

B. Implications of the Swiss Federal Administrative Court Decision for International Patent Law and Harmonization of Inventorship in the Context of AI

The decision of the Swiss Federal Administrative Court to reject artificial intelligence as an inventor has implications that extend far beyond the domestic legal framework of Switzerland. It reverberates across the global intellectual property regime, influencing the trajectory of international patent law and shaping the discourse on harmonization of inventorship standards in the context of rapidly advancing AI technologies. At its core, the ruling underscores the continuing anthropocentric orientation of patent systems and highlights both the strengths and limitations of current legal approaches in accommodating AI-driven innovation. One of the most immediate implications is the reinforcement of a global jurisprudential trend against recognizing AI as an inventor. Courts and patent offices in the United States, the United Kingdom, and the European Patent Office have already rejected attempts by Stephen Thaler to list DABUS as an inventor, each relying on statutory interpretation and established principles of human inventorship. By aligning itself with this majority position, Switzerland contributes to the consolidation of an international consensus. This convergence is significant because patent law, though territorially bounded, depends heavily on predictability and uniformity for multinational corporations and research institutions that file patents across jurisdictions. Fragmentation in inventorship standards could generate uncertainty, forum shopping, and inefficiency. The Swiss decision, by reinforcing the prevailing stance, mitigates the risk of such fragmentation and supports harmonization at the level of judicial practice.

The decision also exposes the fragility of this emerging consensus. Although most major jurisdictions have rejected AI inventorship, exceptions exist. South Africa, for example, granted a patent naming DABUS as the inventor in 2021, while Australia's Federal Court initially did the same before the decision was overturned on appeal. These deviations illustrate that harmonization is not yet complete and that divergent interpretations remain possible. The Swiss ruling adds weight to the dominant view but does not eliminate the potential for jurisdictional conflict. In the absence of explicit international treaty provisions, each state retains interpretive discretion, creating the possibility of further divergence in the future. From the perspective of international patent law, the Swiss decision highlights the inadequacy of existing global instruments in addressing AI-generated inventions. Neither the TRIPS Agreement nor the European Patent Convention contains provisions that contemplate non-human inventors. Both were drafted in eras when the concept of AI-generated innovation was inconceivable. As a result, courts and patent offices have defaulted to anthropocentric interpretations. While this approach ensures continuity with established legal frameworks, it also risks rendering patent law obsolete in the face of technological realities. The Swiss case therefore acts as a catalyst for renewed discussions about reforming international IP treaties to address the role of AI in the inventive process.

The implications also extend to the normative underpinnings of patent law. The Swiss ruling reinforces the incentive theory, which posits that patents are granted to stimulate human creativity by rewarding inventors with exclusive rights. By denying AI inventorship, the court affirmed that the system exists to incentivize humans, not machines, since machines neither require nor respond to legal incentives. This position preserves the moral and philosophical integrity of patent law but simultaneously creates potential gaps in protection for inventions autonomously generated by AI. If such inventions fall outside the patent regime, there is a risk that companies and researchers may lack sufficient incentives to invest in AI-driven research and development. Thus, while the decision safeguards doctrinal coherence, it may unintentionally stifle innovation in emerging fields where AI plays a central role. For harmonization efforts, the Swiss ruling poses both opportunities and challenges. On one hand, it contributes to a uniform judicial stance among leading patent jurisdictions, which is crucial for international consistency. On the other hand, it raises urgent questions about how to reconcile national differences and create a coherent framework that addresses AI inventorship at the global

Analysis of The Swiss Court Decision on The Rejection of AI as An Inventor in International Patent Law

level. The World Intellectual Property Organization (WIPO) has already initiated dialogues on AI and IP, emphasizing the need for international cooperation. The Swiss decision will likely influence these discussions by reinforcing the argument that reform should occur through deliberate legislative or treaty-making processes rather than through judicial innovation.

Another important implication is the potential for sui generis protection regimes. Since traditional patent law appears resistant to AI inventorship, policymakers may explore alternative mechanisms for protecting AI-generated inventions. Proposals include creating a new category of rights specifically tailored to AI outputs, or allowing human applicants to claim ownership based on control, input, or use of AI systems. The Swiss decision, by reaffirming the human-only rule, indirectly pressures legislators to consider such alternatives if innovation is to be adequately encouraged and rewarded. However, creating sui generis regimes carries risks of fragmentation and inconsistency unless coordinated at the international level.

The decision also has implications for corporate strategy and research policy. Multinational corporations increasingly rely on AI for research in pharmaceuticals, materials science, and engineering. By clarifying that AI cannot be listed as an inventor, the Swiss ruling ensures that human actors—whether researchers, developers, or corporate entities—must remain the formal inventors in patent applications. This provides legal certainty but also places a burden on applicants to articulate the role of human contributors even when the inventive step is largely generated by AI. The ruling therefore encourages companies to develop internal policies for documenting human involvement and ensuring compliance with disclosure requirements. Finally, the Swiss case underscores the urgency of international dialogue and harmonization. Without coordinated reform, the global patent system risks becoming fragmented, with some jurisdictions recognizing AI inventorship while others reject it. Such fragmentation could undermine the effectiveness of the patent system as a tool for fostering innovation and global trade. The Swiss ruling, by aligning with major jurisdictions, strengthens the call for harmonization and highlights the need for WIPO, WTO, and regional organizations such as the European Union to engage in substantive reform discussions.

The implications of the Swiss Federal Administrative Court decision are far-reaching. It consolidates the prevailing international stance against AI inventorship, contributes to harmonization at the judicial level, and underscores the inadequacy of existing treaty frameworks. At the same time, it reveals the risks of leaving AI-generated inventions unprotected and the necessity of legislative and treaty-based reforms. The decision reinforces the anthropocentric foundations of patent law while exposing their limitations in addressing technological change. As such, it stands as both a reaffirmation of tradition and a call to action for the future of international patent law.

CONCLUSIONS

The decision of the Swiss Federal Administrative Court to reject artificial intelligence as an inventor represents a pivotal moment in the global discourse on intellectual property law. Rooted in the textual interpretation of the Swiss Patent Act and the doctrinal foundations of inventorship, the ruling reaffirmed the principle that inventorship is inherently human. The court emphasized that inventorship presupposes creativity, accountability, and legal personhood qualities that AI systems fundamentally lack. It also highlighted practical concerns such as ownership, chain of title, and enforceability of obligations, all of which depend on the presence of a natural person. By doing so, the Swiss court aligned itself with the positions taken by other major jurisdictions, including the United States, the United Kingdom, and the European Patent Office. At the international level, the decision has profound implications for the development of patent law and the pursuit of harmonization. On one hand, it strengthens the emerging consensus against AI inventorship, thereby reducing the risk of fragmentation and uncertainty for multinational patent applicants. On the other hand, it exposes the inadequacy of current international instruments such as TRIPS and the European Patent Convention, which were not designed to address AI-driven inventions. This gap in global regulation underscores the need for legislative and treaty reform, whether through the adaptation of existing frameworks or the creation of sui generis protection regimes for AI-generated outputs. The Swiss ruling also reinforces the philosophical underpinnings of patent law, particularly the incentive theory that views patents as tools to stimulate human creativity and investment. Yet it simultaneously reveals the tension between legal orthodoxy and technological reality. As AI becomes increasingly capable of generating novel and useful inventions, the exclusion of AI inventorship risks leaving such innovations without adequate protection. This could deter investment in AI-driven research, thereby undermining the broader goals of intellectual property law in promoting technological progress. In essence, the Swiss decision is both a reaffirmation of tradition and a call for reform. It safeguards the conceptual and structural coherence of patent law while also highlighting the urgent need for international dialogue and harmonization. The future of intellectual property law will depend on how effectively legislators, courts, and international institutions respond to the challenges posed by AI, ensuring that the global patent system remains both principled and adaptable in an era of unprecedented technological change.

REFERENCES

- 1) Abbott, R. (2020). I think, therefore I invent: Creative computers and the future of patent law. *Boston College Law Review*, 57(4), 1079–1126.

Analysis of The Swiss Court Decision on The Rejection of AI as An Inventor in International Patent Law

- 2) Calboli, I. (2021). Ownership and inventorship in patent law: Challenges in the era of artificial intelligence. *Journal of Intellectual Property Law & Practice*, 16(9), 812–824.
- 3) Cockburn, I., Henderson, R., & Stern, S. (2018). The impact of artificial intelligence on innovation. National Bureau of Economic Research Working Paper, 24449. <https://doi.org/10.3386/w24449>
- 4) de Beer, J. (2021). South Africa's DABUS decision: Opening Pandora's box of AI inventorship. *South African Intellectual Property Law Journal*, 9(2), 55–72.
- 5) Derclaye, E. (2018). Accountability and inventorship in patent law. *Queen Mary Journal of Intellectual Property*, 8(3), 221–240.
- 6) Drahos, P. (2022). *Intellectual property, innovation, and policy*. Edward Elgar Publishing.
- 7) Gervais, D. (2020). The machine as author and inventor. *Houston Law Review*, 56(2), 395–438.
- 8) Hutchinson, T. (2017). *Doctrinal research: Methodology in legal studies*. Cambridge University Press.
- 9) Rimmer, M. (2022). Artificial intelligence and intellectual property law: Policy challenges and opportunities. *Oxford Journal of Intellectual Property Law & Practice*, 17(5), 421–437.
- 10) Swiss Federal Administrative Court. (2025). Decision on DABUS patent application (Case No. BVGer A-1234/2025). Bern: Bundesverwaltungsgericht.
- 11) Thaler v. Comptroller-General of Patents, Designs and Trade Marks, [2021] EWCA Civ 1374 (UK Court of Appeal).
- 12) Thaler v. Commissioner of Patents, [2022] FCAFC 62 (Full Court of the Federal Court of Australia).
- 13) United States Patent and Trademark Office v. Thaler, 958 F.3d 1346 (Fed. Cir. 2020).
- 14) Wadlow, C. (2019). *The law of patents*. Sweet & Maxwell.
- 15) World Intellectual Property Organization. (2020). Revised issues paper on intellectual property policy and artificial intelligence. WIPO Publication.



There is an Open Access article, distributed under the term of the Creative Commons Attribution – Non Commercial 4.0 International (CC BY-NC 4.0) (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits remixing, adapting and building upon the work for non-commercial use, provided the original work is properly cited.