

Exploring the Secondary Use of Health Data for Tourism and Travel Safety

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Abstract: This exploratory case study examines the opportunities and challenges associated with the secondary use of health data in the context of health tourism and travel safety, with a particular focus on the European Health Data Space (EHDS) initiative. Using the ManagiDiTH master's programme as a case-based analytical framework, the study investigates the competencies, technological prerequisites and ecosystem structures required to enable responsible secondary data use in health tourism. Rather than evaluating outcomes, the study maps opportunities, challenges, and mechanisms through which interoperable health data could enhance personalization, safety, and cross-border care continuity. The findings demonstrate that competent professionals, interoperable technologies, and robust ecosystem structures are essential for realizing the benefits of secondary health data use in tourism and travel safety. The study advances multidisciplinary digital health education by highlighting the competencies required at the intersection of health, technology and tourism, and it provides insights for future research and practice in health tourism.

Keywords: Exploratory Study; Secondary use of Health Data; IoT; IoMT; Interoperability; Health Tourism; Travel Safety; EHDS; ManagiDiTH.

1. Introduction

The European Health Data Space (EHDS) is a strategic EU initiative designed to create a common and secure ecosystem for the primary and secondary use of health data (Kotsareli and Tsachouridis, 2023). Primary use relates to patient care, while secondary use enables the utilization of data for research, innovation development, policy planning, and the creation of new service models (van Drumpt *et al.*, 2025). EHDS seeks to break down data silos, harmonize standards such as Systematized Nomenclature of Medicine – Clinical Terms (SNOMED CT) and Health Level Seven – Fast Healthcare Interoperability Resources (HL7 FHIR), and ensure data protection by complying with the General Data Protection Regulation (GDPR) and implementing pseudonymization (Chatterjee, Pahari and Prinz, 2022). The ManagiDiTH (Managing Digital Transformation in the Health Sector) project and master's program are the result of international collaboration, designed to lead the digitalization of health services and to promote the utilization of data analytics and information systems for the development of innovations (Rajamäki *et al.*, 2024). At the same time, medical, health and wellness tourism is experiencing rapid growth (Zhong *et al.*, 2021). Travelers seek treatments, rehabilitation, and wellness services abroad for reasons such as cost-effectiveness, access to specialized services, and holistic well-being experiences (Jalali *et al.*, 2025). This development creates a need for seamless data exchange and strong cybersecurity (Rajamäki *et al.*, 2025).

Innovations often emerge at the intersections of different fields, where new combinations of knowledge and technologies create opportunities for disruption and creative destruction (Schumpeter, 1934; Christensen, 1997). Multidisciplinary higher education institutions provide particularly fertile environments for such cross-disciplinary innovation. This study examines innovation opportunities at the interface of healthcare, digitalization, and tourism. By focusing on these intersections, the study highlights how cross-sectoral collaboration and digital transformation can generate new solutions and value creation in health tourism and travel safety. This study aims to examine how the secondary use of health data within the EHDS framework can create added value for the tourism industry, particularly in the context of health tourism. The study explores what business opportunities the utilization of anonymized health data offers for the development of tourism services, how secondary use can improve customer experience, safety, and service personalization, and what competence and infrastructure requirements this sets for both the tourism and health sectors.

This paper is structured as follows. First, the literature review explores the prerequisites, opportunities, and challenges related to the secondary use of health data, the role of IoT and IoMT technologies, and the development of health and smart tourism and their technologies, privacy and trust. Next, the methodology section describes the case study approach and multidisciplinary perspective adopted in the research, as well as the data sources and analysis methods. The findings section presents the results of the ManagiDiTH programme analysis, focusing on the competencies, technologies, and ecosystem requirements for the secondary use of

health data in health tourism and travel safety. Finally, the discussion section compares the findings with previous research, and the conclusions section highlights the implications for education and practice, and outlines directions for future research and development in the field.

2. Literature Review

2.1 Secondary use of Health Data

The content of this section is based on an expert workshop held in November 2023, which focused on the business opportunities, challenges, and solutions related to the secondary use of health data. The workshop brought together researchers and practitioners from various organizations, and its discussions, presentations, and analyses have been compiled and reported in the article of Kilgus *et al.* (2024). This section presents the key findings and conclusions of the workshop as they relate to the topics addressed in this paper, providing timely and diverse perspectives on business opportunities and future directions in the secondary use of health data.

2.1.1 Business Opportunities from Secondary use of Health Data

The secondary use of health data refers to the utilization of data for purposes other than its original intent, such as research, innovation, and policy-making. In recent years, this topic has garnered increasing attention in both research and practice, particularly due to the widespread adoption of electronic health records (EHRs) and the growing volume of patient-generated data from mobile devices and sensors. The European Commission has recognized both the opportunities and challenges of secondary use of health data. It has initiated the development of EHDS, which aims to create a unified European health data ecosystem that enables the secure and efficient sharing of data for both primary and secondary use. This initiative seeks to reduce healthcare costs, improve the quality of care, and promote research and innovation. (Kilgus *et al.*, 2024).

Data quality (DQ) is a fundamental prerequisite for secondary use. DQ is defined as the “fitness for use” and consists of both technical and contextual dimensions. Technical dimensions, such as accuracy and completeness, are objective, whereas contextual dimensions relate to the context of use and the needs of the data consumer. In secondary use, contextual dimensions are particularly emphasized, as data is often repurposed for uses different from those for which it was originally collected. Assessing and ensuring data quality is challenging, as requirements may vary depending on the context of use. For example, the relevance and trustworthiness of data may depend on the user’s expertise and the provenance of the information. Furthermore, data quality assessment often requires manual work and a deep understanding of the data generation process. (Kilgus *et al.*, 2024).

Interoperability and standards are another key prerequisite for secondary use. The adoption of international standards, such as HL7 FHIR, enables the integration of data from different sources and systems. A lack of interoperability complicates the integration and analysis of data, thus limiting the potential for secondary use. However, the development and implementation of standards is challenging, and existing solutions often focus on technical aspects, even though organizational and semantic differences should also be addressed. The ecosystem of secondary use involves several key actors: patients (as data providers and consent granters), physicians (as data collectors), authorities (as regulators), and organizations (as data users). Collaboration and clarity of roles among these actors are essential for realizing the value of data securely and effectively. (Kilgus *et al.*, 2024).

In addition to data quality and interoperability, key challenges include patient consent, data protection, anonymization/pseudonymization, and the valuation of data. For example, anonymization enables broader use of data, but it is essential to ensure that patient privacy is maintained and that data cannot be re-identified. Proposed solutions include the adoption of international standards, comprehensive metadata documentation, multidisciplinary collaboration, and clear regulatory and governance models. Continuous quality monitoring and improvement, as well as the involvement of patients and other stakeholders in data governance and use, are also emphasized. The secondary use offers significant opportunities for the development of healthcare, research, and innovation. Successful secondary use requires high-quality and interoperable data, clear regulatory and governance models, and collaboration among stakeholders. European initiatives such as the EHDS aim to create the conditions for the secure and effective use of data for the benefit of society as a whole. (Kilgus *et al.*, 2024).

2.1.2 IoT and IoMT Technologies as Secondary Sources of Health Data

The Internet of Medical Things (IoMT) signifies a major leap forward in the healthcare sector, enabling interconnected medical devices to transmit real-time data and enhance patient care (Vishnu, Ramson and Jegan, 2020). Combining medical devices with the Internet of Things (IoT), IoMT systems represent the future of healthcare, where every device is connected and monitored online by healthcare professionals. This advancement promises faster and more affordable healthcare (Razdan and Sharma, 2022). This vision is already a reality, with wearable IoMT devices like smartwatches and patches becoming essential for managing chronic diseases, remote monitoring, and predicting health issues. These advancements enable quicker patient care and can potentially save lives (Kamalov *et al.*, 2023).

This data is valuable not only for supporting individualized care and diagnostics but also for secondary uses, including research, service development, and healthcare innovation. The effective secondary use of IoT/IoMT data requires high data quality, interoperability, and adherence to established standards. International and European standards, such as HL7 FHIR, enable the integration of data from different systems and countries. At the same time, challenges related to data protection, anonymization, and ethical considerations must be addressed to ensure responsible use. (Kilgus *et al.*, 2024).

Secondary use of IoT/IoMT data enables, for example:

1. Large-scale research datasets and real-time public health monitoring,
2. AI-based analyses and predictive modeling,
3. The development of new services and business models (e.g., remote monitoring, wellness services), and
4. Personalized care pathways and risk management.

In practice, leveraging IoT/IoMT data for secondary purposes requires multidisciplinary collaboration between technology, healthcare, and service design professionals. Furthermore, clear regulatory and governance frameworks are needed to ensure the secure and ethical use of such data for secondary purposes.

2.2 Health Tourism

Health tourism is a rapidly expanding sector in the global tourism industry, driven by individuals seeking non-emergency, high-quality healthcare services abroad (Jalali *et al.*, 2025). Motivations include lower costs, access to specialized care, and reduced waiting times. The growth of health tourism brings economic benefits, such as increased revenue and foreign exchange, but faces significant challenges. Key factors influencing health tourism include infrastructure, human resources, financial considerations, service quality, marketing, stakeholder cooperation, legal frameworks, and international relations. Barriers such as inadequate transportation, outdated medical equipment, and weak insurance systems can limit access for international patients. Conversely, internationally accredited hospitals, strong transport links, and attractive cultural resources enhance a destination's appeal.

Communication and human resources are critical. Language barriers, shortages of specialized staff, and insufficient communication skills can undermine patient experiences. Solutions include language training, international recruitment, and professional development for healthcare staff. Financial aspects also play a major role. High treatment costs and limited government support can deter patients, while affordable services and public investment can stimulate growth. Service quality is essential; lack of international certification, poor follow-up care, and limited translator access are common obstacles. Improvements in quality standards, technology adoption, and comprehensive service packages are effective facilitators. Effective marketing and information dissemination are also vital. Poor visibility, lack of information in foreign languages, and weak branding can hinder growth. Digital platforms, international exhibitions, and strong branding strategies help attract health tourists. Stakeholder cooperation is often hampered by poor coordination between healthcare and tourism providers and unclear responsibilities. Enhanced collaboration, research, and integration of services improve patient experiences. (Jalali *et al.*, 2025).

Legal and governmental barriers, such as complex regulations and visa issues, can impede growth, while supportive policies and clear frameworks facilitate it. International relations and security concerns, including political instability and disease outbreaks, can affect patient flows. Bilateral agreements and improved security measures are important for building trust. Digitalization and information management are increasingly important, enabling better access to information, service personalization, and risk management. Secure data exchange and interoperability are essential for safe, high-quality cross-border care. The development of health

tourism requires addressing infrastructural, human, financial, service, marketing, legal, and international challenges. Digital solutions and effective information management further support accessibility, quality, and safety, enabling new business models and international cooperation in the sector. (Jalali *et al.*, 2025).

2.3 Smart Tourism Technologies, Privacy and Trust

Smart tourism technologies (STTs)—including mobile payment systems, IoT-enabled services, AR/VR applications and destination apps—form an increasingly integral part of the contemporary travel experience. Their value lies in providing personalized, data-driven services, yet this same reliance on personal data raises significant privacy and trust concerns among travelers. According to Ivars-Baidal *et al.* (2023), the relationship between tourism governance and smart city initiatives needs to be redefined to achieve synergies that increase the inclusiveness and efficiency of urban tourism policies.

Ngan, Eddy and Fong (2025) demonstrate that travelers' reactions to STTs can be explained through Protection Motivation Theory (PMT). Privacy concerns arise from travelers' assessments of the severity and likelihood of data breaches, while their willingness to engage with STTs depends on their perceived ability to manage privacy settings and the effectiveness of available protection measures. Crucially, trust in technology providers reduces perceived susceptibility to privacy threats and strengthens coping appraisals, thereby enhancing technology acceptance (Ngan, *et al.*, 2025).

Privacy evaluations also have clear implications for tourism outcomes. Higher privacy concerns reduce traveler satisfaction and destination loyalty, whereas proactive privacy-protection behaviors—such as configuring privacy settings—can enhance both. Ioannou, Tussyadiah and Miller (2021) argue that travelers' privacy concerns are multidimensional: they include both self-privacy concerns (fears of losing control over one's own data) and normative privacy concerns (beliefs about how companies should handle personal information). These concerns shape trust and perceived risk, with higher privacy concerns lowering trust in travel service providers and increasing perceived risk associated with data disclosure. Since trust is a key precondition for travelers' willingness to share personal information weak trust can amplify the negative effects of privacy concerns on satisfaction and loyalty (Ioannou, *et al.*, 2021).

In the context of health tourism, travelers' privacy concerns are amplified because they involve highly sensitive information (e.g., medical history, biometric identifiers, IoT/IoMT-generated health signals). Research also shows that privacy concerns consist of both personal fears of losing control over one's data and normative expectations about how organizations should manage sensitive health information (Ioannou, *et al.*, 2021). These concerns shape trust and perceived risk, which in turn determine whether travelers are willing to disclose the health data required for personalized treatments, cross-border care continuity and safe travel. Consequently, effective data governance and transparent privacy practices are essential for enabling travelers to confidently share health information and for ensuring that secondary use of health data genuinely enhances quality, safety and satisfaction in health tourism.

3. Methodology

This study employs Yin's (2018) case study research method and adopts a multidisciplinary approach, integrating perspectives from healthcare, tourism, information systems, cybersecurity, and education. The primary research material consists of the educational content and learning objectives developed within the ('ManagiDiTH – Master of Managing Digital Transformation in the Health Sector', 2025) project, which encompasses digital health competencies, information systems, data analytics, interoperability, data protection, and ethical considerations. Document analysis and observation are applied as research methods. Qualitative content analysis and triangulation are employed in the data analysis. The research examines how the secondary use of health data can be implemented and developed in the context of health tourism, as well as the competency, technology, and ecosystem requirements this entails from the perspectives of digital healthcare and related fields.

3.1 Case Context and Selection

The case is the ManagiDiTH project and master's programme that represents an international collaboration between ISCTE – University Institute of Lisbon, Laurea University of Applied Sciences, and Aristotle University of Thessaloniki. This fully online master's programme is specifically designed for future professionals, leaders, and change-makers in the social and health care sector. The programme aims to lead the digital transformation of

health services and to promote the adoption of data science and information systems for the development of innovative clinical approaches, service models, and process reorganization. The curriculum of the ManagiDiTH master's programme comprises three main components: health sector skills, societal skills, and digital skills. Within the digital skills component, students may choose between two specialization tracks—Data Science or Interoperability—according to their interests and prior experience.

The programme was purposively selected for three reasons:

1. It explicitly targets digital health competencies (data analytics, interoperability, regulation, ethics) that are prerequisites for secondary health data use;
2. It operates across national contexts, aligning with cross-border data exchange scenarios central to tourism and travel safety; and
3. It provides comprehensive curricular artefacts and practice-oriented learning outcomes that can be systematically analyzed.

3.2 Unit of Analysis and Research Question

The Unit of Analysis (UoA) is: Secondary use of health data in health tourism and travel safety – specifically, the utilization of data produced by IoT and IoMT technologies to improve traveler safety, service quality, and the overall travel experience in international travel, in which individuals seek health services, treatments, or wellness services abroad. UoA is observed and evaluated from the perspectives of education, service development, and practical implementation.

The study addresses the following research question: How can the ManagiDiTH programme enhance the secondary use of health data in health tourism and travel safety?

4. Findings

4.1 Secondary use of Health Data in the ManagiDiTH Program

ManagiDiTH addresses the secondary use of health data as a core theme, explored from technical, ethical, and regulatory perspectives. Students gain competencies that enable the utilization of health data for research, development, and service improvement. Key course components include:

- *MD10 Health Data and Information Systems*: This course covers health data collection, analysis, and reporting, as well as the impact of information systems on care quality, safety, and cost-effectiveness. It also addresses data usage and analytics, which are directly linked to secondary use.
- *OD11 Data Analytics and Machine Learning*: Students learn to leverage health data through machine learning and analytics, essential for advancing diagnostics, treatment, and service development.
- *OD13 Technologies in Interoperable Ecosystems in Health*: The course focuses on interoperability, standards, and data exchange, which are prerequisites for secondary use across systems and organizations.
- *OH04 Regulation, Legislation and Structures in Health* examines the EU regulatory framework for digital health and well-being (including EHDS), which enables and governs the secondary use of health data.

The curriculum emphasizes practical experience in data collection, analysis, and reporting, while fostering an understanding of data's role in improving care quality, safety, and cost-efficiency. Secondary use of health data—such as for research, analytics, service development, and data exchange—is integrated into the program's learning objectives. Opportunities beyond healthcare include: 1) insurance and risk management services, 2) business and ecosystem development, 3) education and skills enhancement (e.g., cybersecurity, data analytics, service innovation), and 4) societal decision-making and regulation (e.g., privacy practices, international data exchange). Through this approach, ManagiDiTH provides comprehensive expertise to support the responsible and multidisciplinary secondary use of health data.

4.2 IoT and IoMT Technologies as Health Data Sources

OD16 Sensors for Medical Instrumentation and Signal Processing Course emphasizes the role of the Internet of Things (IoT) and the Internet of Medical Things (IoMT) in healthcare. These technologies generate vast amounts of sensor data, which can be utilized not only for primary patient care but also for secondary purposes such as research, service development, and innovation. The course highlights competencies in collecting, processing, analyzing, and securely managing health data. These skills are essential for leveraging health information in secondary use cases, including service improvement, quality enhancement, and the development of new solutions. The course addresses standards for biosignal acquisition and sensor networks, as well as national and European regulations and certifications. Mastery of interoperability and standards enables the secondary use of health data across organizational and national boundaries.

When evaluating this course unit, Rajamäki and Postolache (2025) underscore the importance of multidisciplinary collaboration—such as triological learning and academia-industry partnerships—as prerequisites for secondary use of health data in developing new services, products, and solutions. Innovations often emerge at the intersections of technology, healthcare, and service design. Students learn to select and implement sensor technologies and biosignal processing methods that enable comprehensive health data collection and utilization. Applications include public health monitoring, diagnostics, personalized services, and enhanced safety.

OD16 Course relates to the secondary use of health data primarily through competencies in managing, analyzing, and utilizing data produced by IoT/IoMT technologies. It emphasizes multidisciplinary collaboration, the significance of standards and interoperability, and the emergence of innovations at cross-disciplinary interfaces—all of which are critical enablers for secondary use in research, service development, and even areas such as travel safety.

4.3 Health Tourism

ManagiDiTH addresses the needs of health tourism by educating professionals who integrate digital infrastructure, health data management, and international collaboration. The program’s contributions can be categorized into the areas shown in Table 1. ManagiDiTH produces professionals capable of developing and managing digital, international, and customer-centric solutions for health tourism. These competencies enhance service quality, safety, and accessibility while creating new business opportunities.

Table 1: Barriers and facilitators in health tourism development

Focus Area	Description of Contribution
Development of digital services	The program equips students to design and implement solutions such as secure cross-border patient data transfer systems, teleconsultation platforms, and digital appointment scheduling. These technologies streamline care pathways and enhance patient experience in cross-border healthcare.
Utilization of health data for personalization	Applying data analytics and artificial intelligence enables the creation of individualized treatment packages and risk management strategies. IoT and IoMT devices generate health data that supports the monitoring and personalization of services for travelers. Secondary use of health data can also improve travel safety and epidemic management.
Interoperability and international data exchange	Interoperability is a critical prerequisite for cross-border patient data exchange. International standards (HL7 FHIR) ensure secure information sharing and continuity of care.
Security and ethical considerations	Cybersecurity, data protection, and crisis management are essential for mitigating risks in health tourism. The program also addresses ethical and legal aspects related to data usage and patient rights.
Business competence and innovation	ManagiDiTH fosters capabilities to develop new service concepts and digital platforms that integrate healthcare, tourism, and security solutions. This supports ecosystem building and multidisciplinary collaboration.

The findings indicate a coherent mechanism through which the secondary use of health data can generate value for tourism through emotion monitoring and travel safety particularly for user with chronic impairments. First, data generation via IoT/IoMT wearables and sensor platforms produces continuous, traveler-centric signals on health status and risk exposure. Second, data processing and interoperability—grounded in standards such as HL7 FHIR and supported by competent professionals—enable secure aggregation across providers and

jurisdictions, which is a prerequisite for cross-border care continuity. Third, analytics-enabled personalization translates interoperable datasets into adaptive service pathways (e.g., tailored pre-travel screenings, medication adherence reminders, and dynamic access to local care resources), improving traveler experience and reducing uncertainty. Finally, operational integration with tourism service providers (destinations, accommodation, insurance, platform operators) supports preparedness (e.g., surge capacity planning), incident response (e.g., rapid referral protocols), and post-incident learning. Taken together, these mechanisms show how the ManagiDiTH-derived competencies (data management, interoperability, regulation, cybersecurity) are not merely technical capabilities but actionable enablers for data-driven travel safety and quality of service in real tourism contexts.

5. Discussion

The findings from the ManagiDiTH programme highlight the prerequisites for the secondary use of health data, including technical expertise, ethical considerations, and regulatory knowledge. These results are consistent with the literature review (section 2.1.1), which emphasizes the importance of data quality, interoperability, and clearly defined stakeholder roles in secondary data use. The programme's focus on practical skills in data collection and analytics aligns with proposed solutions in the literature, such as the adoption of international standards, multidisciplinary collaboration, and continuous quality monitoring.

Results regarding IoT and IoMT technologies reinforce the perspectives presented in the literature review (section 2.1.2), which identifies sensor technologies and the data they generate as central sources for secondary health data use. The programme emphasizes competencies in data acquisition, analysis, and secure management, directly addressing challenges highlighted in the literature, such as data quality, interoperability, and ethical concerns. Furthermore, the programme's emphasis on multidisciplinary collaboration and standards management supports the literature's call for responsible and effective utilization of health data.

The findings of the ManagiDiTH programme demonstrate that the development of digital services, the use of health data for personalization, and international data exchange are key drivers for advancing health tourism. This is in accordance with the literature review (section 2.2), which stresses the significance of infrastructure, expertise, service quality, and digital solutions for the growth and safety of health tourism. The programme's focus on cybersecurity, data protection, and multidisciplinary competence further supports the requirements for high-quality and secure health tourism identified in the literature.

The secondary use of health data through IoT and IoMT technologies offers significant benefits for the development of health tourism and travel safety. Competent professionals, interoperable technologies, and well-defined ecosystem structures are prerequisites for sustainable and secure data exchange. The ManagiDiTH project's educational content (OD 16) supports the creation of these prerequisites and provides a foundation for future digital health and tourism services.

6. Conclusions

This study extends tourism research by demonstrating how the secondary use of health data, enabled by EHDS and IoT/IoMT technologies, can enhance travel safety, service personalization, and cross-border care pathways. By connecting digital health infrastructures with tourism service development, the research offers a novel perspective on data-driven safety management and traveler experience optimization. The findings highlight concrete mechanisms through which interoperable health data ecosystems can support destination preparedness, risk mitigation, and customer-centric service innovation, thereby contributing new conceptual and practical insights to tourism scholarship.

In future work, this research should be extended with comprehensive empirical data, systematic analysis, and deeper comparative evaluation. Another direction for future research is to empirically examine how different tourism stakeholders—such as destination management organizations, travel health insurance providers, healthcare institutions, and digital platform operators—can operationalize the secondary use of health data within real travel environments. This would allow researchers to evaluate practical barriers, economic impacts, data-driven service innovations, and governance requirements in authentic cross-border settings. Such investigations would deepen understanding of how interoperable health data ecosystems can be integrated into tourism operations and how they influence traveler safety, service quality, and overall user experience.

Ethics Declaration

Ethical clearance was not required for the research.

AI Declaration

Artificial intelligence was utilized in the writing process to support literature review synthesis, facilitate comparative analysis between findings and previous research, and assist in the formulation and translation of academic text. AI tools such as Keenious and Copilot enabled efficient information retrieval, structured drafting, and linguistic refinement, thereby enhancing the clarity, coherence, and overall quality of the manuscript. While all conceptual contributions and interpretations remain the responsibility of the author.

Acknowledgment

This research was conducted within the Master of Managing Digital Transformation in the Health Sector (ManagiDiTH) Project and was supported by funding from the European Health and Digital Executive Agency (HADEA) EU executive agency, under the powers delegated by the European Commission. The project number is 101083896. The views and opinions expressed in this paper are the sole responsibility of the authors and do not necessarily reflect the official positions of the European Union or the European Commission. Special acknowledgements go to the project partners for their collaboration and partnership in the development work of the ManagiDiTH project.

References

- Chatterjee, A., Pahari, N. and Prinz, A. (2022) 'HL7 FHIR with SNOMED-CT to Achieve Semantic and Structural Interoperability in Personal Health Data: A Proof-of-Concept Study', *Sensors*, 22(10), p. 3756. Available at: <https://doi.org/10.3390/s22103756>.
- Christensen, C.M. (2015) *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Harvard Business Review Press.
- van Drumpt, S. et al. (2025) 'Secondary use under the European Health Data Space: setting the scene and towards a research agenda on privacy-enhancing technologies', *Frontiers in Digital Health*, 7. Available at: <https://doi.org/10.3389/fdgth.2025.1602101>.
- Ioannou, A., Tussyadiah, I. and Miller, G. (2021) 'That's Private! Understanding Travelers' Privacy Concerns and Online Data Disclosure', *Journal of Travel Research*, 60(7), pp. 1510–1526. Available at: <https://doi.org/10.1177/0047287520951642>.
- Ivars-Baidal, J. et al. (2023) 'Smart tourism city governance: exploring the impact on stakeholder networks', *International Journal of Contemporary Hospitality Management*, 36(2), pp. 582–601. Available at: <https://doi.org/10.1108/IJCHM-03-2022-0322>.
- Jalali, M. et al. (2025) 'Health tourism: a global perspective on the barriers and facilitators', *Discover Public Health*, 22(1), p. 157. Available at: <https://doi.org/10.1186/s12982-025-00545-2>.
- Kamalov, F. et al. (2023) 'Internet of medical things privacy and security: Challenges, solutions, and future trends from a new perspective', *Sustainability*, 15(4), p. 3317.
- Kilgus, T. et al. (2024) 'Creating value from the secondary use of health data: International examples, best practices, and opportunities to scale', *Communications of the Association for Information Systems*, 55(1), pp. 507–534.
- Kotsareli, K. and Tsachouridis, P. (2023) 'European Health Data Space: A New Era in EU Health', *HAPSc Policy Briefs Series*, 4(2), pp. 91–96. Available at: <https://doi.org/10.12681/hapscpbs.36664>.
- ManagiDiTH (2025) 'ManagiDiTH – Master of Managing Digital Transformation in the Health Sector'. Available at: <https://managidith.eu/> (Accessed: 25 November 2025).
- Ngan, H.F.B., Eddy, M.E. and Fong, M.H. (2025) 'Trust, privacy and smart tourism technologies (STTs): Effects on satisfaction and destination loyalty', *Journal of Vacation Marketing*, p. 13567667251383176. Available at: <https://doi.org/10.1177/13567667251383176>.
- Rajamäki, J. et al. (2024) 'Enhancing Cybersecurity Education for the Healthcare Sector: Fostering Interdisciplinary ManagiDiTH Approach', in *2024 IEEE Global Engineering Education Conference (EDUCON). 2024 IEEE Global Engineering Education Conference (EDUCON)*, pp. 1–7. Available at: <https://doi.org/10.1109/EDUCON60312.2024.10578769>.
- Rajamäki, J. et al. (2025) 'The Critical Role of Cybersecurity Education in Health Tourism', in *Proceedings of The 7th International Conference on Tourism Research*. Academic Conferences and publishing limited. Available at: <https://books.google.com/books?hl=fi&lr=&id=sXtqEQAAQBAJ&oi=fnd&pg=PA234&dq=rajam%C3%A4ki+health+tourism&ots=e9lyta0ycD&sig=Ehgq3HnPVbZvR-16ZIRHxX8iosE> (Accessed: 26 November 2025).
- Rajamäki, J. and Postolache, O.A. (2025) 'Triological Learning and Academia-Industry Partnerships in "Sensors for Medical Instrumentation and Signal Processing" Curricular Unit of the ManagiDiTH Master's Program', in M.E. Auer and T.

- Rüütman (eds) *Futureproofing Engineering Education for Global Responsibility*. Cham: Springer Nature Switzerland (Lecture Notes in Networks and Systems), pp. 157–168. Available at: https://doi.org/10.1007/978-3-031-85652-5_17.
- Razdan, S. and Sharma, S. (2022) 'Internet of Medical Things (IoMT): Overview, Emerging Technologies, and Case Studies', *IETE Technical Review*, 39(4), pp. 775–788. Available at: <https://doi.org/10.1080/02564602.2021.1927863>.
- Schumpeter Joseph, A. (1934) 'The theory of economic development', *An inquiry to* [Preprint].
- Vishnu, S., Ramson, S.J. and Jegan, R. (2020) 'Internet of medical things (IoMT)-An overview', in *2020 5th international conference on devices, circuits and systems (ICDCS)*. IEEE, pp. 101–104. Available at: <https://ieeexplore.ieee.org/abstract/document/9075733/> (Accessed: 26 November 2025).
- Yin, R.K. (2018) *Case study research and applications: design and methods*. Sixth edition. Los Angeles London New Delhi Singapore Washington DC Melbourne: SAGE.
- Zhong, L. *et al.* (2021) 'Medical, Health and Wellness Tourism Research—A Review of the Literature (1970–2020) and Research Agenda', *International Journal of Environmental Research and Public Health*, 18(20), p. 10875. Available at: <https://doi.org/10.3390/ijerph182010875>.