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WEB-BASED IDEA MANAGEMENT AND QUADRUPLE HELIX NETWORKING OF CREATIVE INDUSTRY COHORTS FOR COVID-19

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Abstract. On the one hand, web-based idea management platforms such as IdeaScale, Spigit, and BrightIdea can be used to facilitate the sharing of ideas and insights from existing EU and international cohorts of relevance to COVID-19. These platforms can be used to capture ideas from the experts, employees, public and other stakeholders (internal and external), and to facilitate the exchange of ideas and insights in a structured and organized way. On the other hand, Quadruple Helix networking can be used to facilitate collaboration and knowledge sharing between existing EU and international cohorts of relevance to COVID-19. This approach involves bringing together four key stakeholders – government, industry, academia, and civil society – to work together to develop solutions to the grand societal challenges posed by the pandemic. In this paper authors will fill the gap between web-based IMS practical application and theoretical framework of Quadruple Helix model to demonstrate potential benefits of merging of these elements. To bridge the gap systematic and analytical literature review will be done to create new Quadruple Helix web-based IMS framework and demonstrate it in action with case study taken from the creative industry. Aim of the research: potential of web-based idea management application in Quadruple Helix context in networking of existing EU and international cohorts of relevance to COVID-19. To reach the aim this research uses a combination of literature review, action-based research, and descriptive analysis to analyse the data and draw conclusions. Main conclusions: proves the potential of web-based IMS application with Quadruple Helix context. The application of the web-based IMS and Quadruple Helix approach is holistic and adaptable. Authors have created Quadruple Helix Adaptation in Idea Management Application Framework by including elements such as: Application elements includes: P1 is idea generation process, P2 is idea evaluation, P3 continuation of IM; Adaptation elements includes Quadruple Helix approach partners: Q1: universities, Q2: civilians; Q3: businesses; Q4: government.

Keywords: web-based idea management, idea management systems, networking, quadruple helix, creative industry, cohorts.

JEL Classification: M15, O36, O32.

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1. Introduction

The outbreak of the COVID-19 pandemic in 2020 still undermines the world economy, the affordability and accessibility of our health systems. COVID-19 vaccines are an example of unprecedented rapid innovation within a Quadruple Helix setting. The sense of urgency has prompted academic research institutions, big pharmaceuticals and dedicated biotechnology companies to co-innovate and develop vaccines targeting the SARS-CoV-2 coronavirus disease, simultaneously unlocking new value for business, patients and society (Segers & Gaile-Sarkane, 2021). Web-based idea management techniques were without any doubt a useful means for innovative solutions for COVID (vaccines, medical appliances and devices, medical technology, etc), but is has been used also in other industries such as creative industries.

Web-based IMS provides organisations with the opportunity to capture ideas from a wide variety of sources, including customers, employees, and partners (Mikelsone et al., 2022a; 2022c). This enables organisations to tap into the collective intelligence of their stakeholders and to identify and evaluate the best ideas. Additionally, web-based IMS can be used to facilitate collaboration and

communication between stakeholders, which can further enhance the quality of ideas and the innovation process. Furthermore, web-based IMS can be used to track the progress of ideas, and to provide feedback to stakeholders on the progress of their ideas. This can help to ensure that ideas are implemented in a timely manner and that stakeholders are kept informed of the progress of their ideas. There are a lot of software solutions for the idea management (Alexe et al., 2020). In the context of this dynamic Quadruple Helix and web-based IMS synergy, the debate on the role of Artificial Intelligence (AI) in idea management takes centre stage. Advocates, as evidenced by Haase and Hanel (2023) and Guzik et al. (2023), assert that AI can enhance creativity, presenting potential avenues for co-innovation in diverse sectors. On the contrary, sceptics like Runco (2023) and Bart (2023) underscore the limitations of AI in recognizing genuine creativity, challenging the authenticity of AI-generated ideas (Acar, 2023). These debates shape the ongoing narrative on harnessing technology, collaborative frameworks, and AI within the Quadruple Helix approach to address global challenges and drive innovation across industries, including healthcare and creative sectors.

IMS is a tool that helps to capture, store, and analyse ideas. It can be used to identify trends, prioritize ideas, and develop new products and services. It can also be used to identify potential areas of improvement and to track progress. IMS can be used to create a collaborative environment where ideas are shared and discussed. It can also be used to facilitate communication between departments and to ensure that ideas are properly evaluated and implemented.

IMS can be used to create a culture of innovation and to foster a climate of creativity. It can also be used to encourage employees to think outside the box and to come up with new ideas. IMS can be used to identify potential areas of improvement and to track progress. It can also be used to facilitate communication between departments and to ensure that ideas are properly evaluated and implemented.

Overall, IMS is a powerful tool that can help organizations to manage ideas in a more structured and efficient manner. It can be used to create a culture of innovation, to foster a climate of creativity, and to identify potential areas of improvement. It can also be used to facilitate communication between departments and to ensure that ideas are properly evaluated and implemented.

Triple and Quadruple Helix have the scientific basis of the Research and Innovation Strategies related to Smart Specialisation (RIS3) (Deakin, 2022; Marques et al., 2021) that are connected with web-based IMS and there are researches about it, there are also papers about these helix in time of platforms (Borghys et al., 2020; Vallance et al., 2020), but there are no researches about web-based IMS and Quadruple helix. The research will provide a general model for web-based IMS applications with Quadruple Helix approach. It will also provide a comprehensive overview of web-based IMS application types in the professional practices, which will help companies to understand how they can apply web-based IMS and the key aspects they need to consider in their application of a specific IMS and its type. Finally, the research will provide a structured approach to the different IM models through the Quadruple Helix approach, which will help to identify the multidimensional context of web-based IMS.

Aim of the research: potential of web-based idea management application in Quadruple Helix context in networking of existing EU and international cohorts of relevance to COVID-19.

This research will have both academic and practical contributions by filling the following gaps:

Knowledge gap – no research looks at different IM models through a structured approach like the Quadruple Helix Model. Indeed, not that much literature on connecting helix thinking (holistic view) with the use of techniques of IM.

Empirical Gap is identified – there are literature reviews that include descriptions of different IM types but does not summarize these types based on classification. These IM types are mostly looked at from a theoretical perspective with no further focus or elaboration through empirical research. There is an emerging connection with solving societal challenges such not only in climate change and COVID direct results perspective but also in culture and other spheres.

Theory Gap is identified – there is a lack of a general model for corporate IM models (Gerlach & Brem, 2017). According to Sandriev and Pratchenko (2014), IMS provides a qualitative increase in the effectiveness of innovative activities in companies (Sandriev & Pratchenko, 2014). That is the reason this paper aims to describe the different IMS classifications based on the Quadruple Helix approach.

2. Methodology

This research uses a combination of literature review, action-based research, and descriptive analysis to analyse the data and draw conclusions. The research process is outlined in Figure 1, which shows the stages of the research, the sources of data, and the digital tools used.

This approach enables the researcher to gain a better understanding of the enablers and obstacles of the intervention, the solutions or activities performed, and the impact of the intervention on the organization (Somekh, 2005). According to Somekh (2005), this study assumed eight methodological principles of action-based research see in Figure 2.

2.1. Literature review

The theoretical framework was developed through a critical literature review, which was conducted in four stages. Firstly, scientific databases were searched using the terms "idea management", "idea management systems", and "quadruple helix". Secondly, literature directly related to

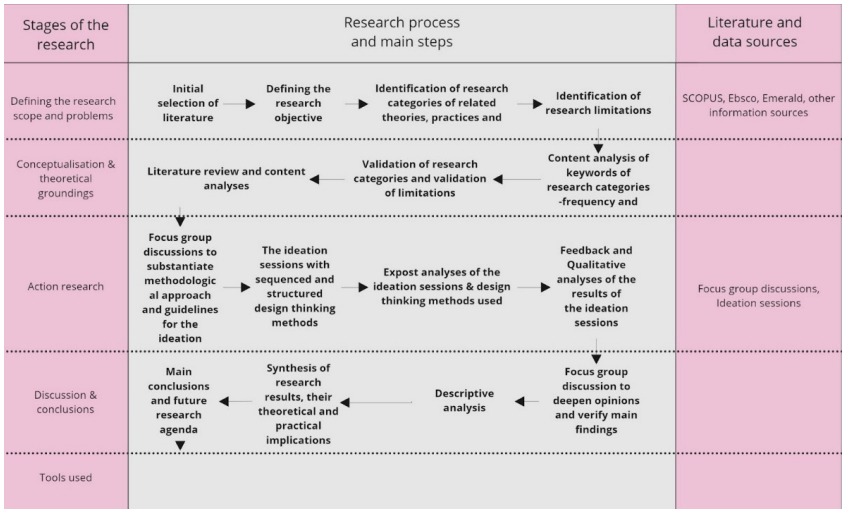

Figure 1. The methodological framework of this research (source: the authors)

Figure 2. The methodological principles (source: the authors)

idea management, idea management systems, and quadruple helix was selected. Thirdly, articles that were duplicates or did not have full-text availability were excluded. See in Table 1.

Authors used the Scopus database to collect publications related to IM, IMS, and QH. They then used the VOSviewer tool to analyse the keywords in the titles of the publications and to create a network visualization of the correlations between them.

The authors of this article conducted a network analysis of existing publications related to web-based idea management (IM) and Quadruple Helix (QH) networking in the context of COVID-19. This analysis was carried out with a focus on understanding the correlations and impacts of these publications within the context of the creative industry.

To begin, the authors performed a search for relevant terms using the Scopus database, as it is known to contain a large number of publications on IM, IMS, and QH. The search results were filtered and refined for further analysis. Keywords in the titles of the publications were then assessed using the VOSviewer visualization tool, which is effective at clustering and visualising data. This tool was used to present the network of keyword correlations in a clear and concise manner (Van Eck & Waltman, 2017). The entire process is depicted in Figure 3.

Table 1. Count of the literature sources in stages (source: created by authors)

Stages	Stage 1 – in article title and/or keywords in the article:			Stage 2 – directly about (full text available):			Stage 3 – unique sources:		
	IM	IMS	QH	IM	IMS	QH	IM	IMS	QH
Scopus	66 459	28 870	602	130	42	555	316	988	2009
Google Scholar	5 200 000	5 080 000	43 500	102	29	789			
Ebsco	94	4	127	12	4	111			
Web of Science	406	38	617	72	13	554			
Sum:	5 266 959	5 108 902	44 846	316	88	2009			
! Every term was searched for in the different databases, based on the scientific database availability									

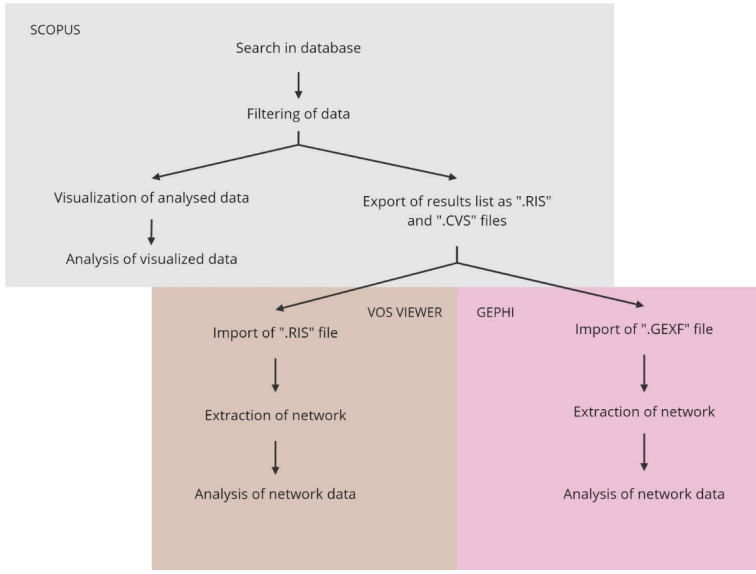

Figure 3. Network analysis procedure (source: the authors)

2.2. Case studies

This research is based on a qualitative research method, combining the literature review and the action-based research with the ideation sessions using design thinking methods in the focus group discussions, and a descriptive analysis to synthesize the results of the research, implications and future research issues. The methodological framework of this research is presented in Table 2, illustrating the main stages of the research, the literature, and data sources, as well as digital tools used.

Table 2. Case study steps

Data gathering method	Data analysis method	Time Period	Method application steps
Action research of the Case	Content analysis	2022	1. Literature review-based framework creation 2. Practical case of framework implementation in real life. 3. The desk review of documents and information gathered within event. 4. The content analysis of materials. 5. The descriptive analyses of the preparation, performance and the evaluation of a practical application.

3. Results

3.1. Literature review and new framework

To identify new trends in the field network, analysis of the keywords was executed. Keywords in title, abstract, keywords by using the following function: "(TITLE-ABS- KEY ("quadruple helix") AND TITLE-ABS-KEY ("idea management")). Document type only articles (LIMIT-TO (DOCTYPE, "ar")), limitation to social sciences a (LIMIT-TO (SUBJAREA, "SOCI")) and area business management (LIMIT-TO (SUBJAREA, "BUSI")). This led to identifying 2073 documents. For further investigation, ". RIS" and ". CVS" files were exported from Scopus database for further analysis. The identified keywords were investigated using the tool VOSviewer to detect their interconnections (van Eck & Waltman, 2022). It is possible to observe the development of the topic and to deduce new perspectives. The system of linked keywords is represented as a network. The colours point to the clusters in which most of the keywords of a group occur together. The size of the node shows the connection degree of the keywords. 38 keywords included 5 clusters, 158 links found. As seen, the most affiliating keyword is "knowledge". This is also the most connected keyword in its cluster. See in Figure 4.

Knowledge and web-based idea management systems are well connected terms. Knowledge management systems are software applications that are used to store, organize and manage information within an organization. These systems are designed to help organizations capture, store, and share knowledge, as well as to facilitate collaboration and communication. Knowledge management systems can be used to store documents, data, and other types of information. Idea management could be looked also as part of knowledge management (Ferreira et al., 2019). They can also be used to track and analyse trends, and to facilitate decision-making. Web-based idea management systems are software applications that are used to capture, store, and manage ideas within an organization. These systems are designed to help organizations capture and store ideas, as well as to facilitate collaboration and communication. Web-based idea management systems can be used to store documents, data, and other types of information. They can also be used to track and analyse trends, and to facilitate decision-making.

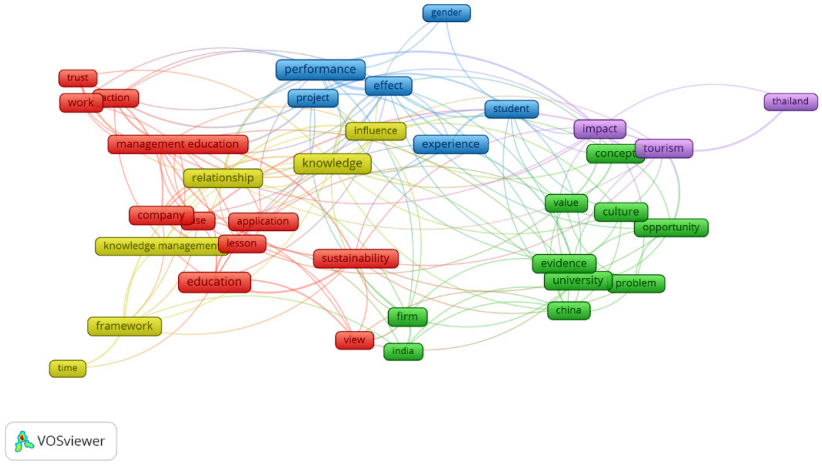

Figure 4. Network analysis results (keyword perspective) (source: the authors)

The second largest node is the keyword "management education". Web-based idea management systems can be used to capture, organize, and prioritize ideas from employees, customers, and other stakeholders. These systems can also be used to track the progress of ideas and to provide feedback to those who submit them. Management education can be used to teach managers how to use these systems effectively and how to incorporate the ideas into their organization. Management education can also provide guidance on how to evaluate ideas and how to implement them. Additionally, management education can help managers understand the value of idea management systems and how to use them to create an environment of innovation and collaboration.

Third "performance". Web-based idea management systems are designed to help organizations capture, organize, and track ideas from employees and other stakeholders. They typically include features such as idea submission, voting, discussion forums, and analytics. Performance features may include the ability to measure the impact of ideas, track progress, and provide feedback to contributors.

But fourth "impact" – web-based idea management systems are tools that allow businesses to capture, store, and manage ideas from employees, customers, and other stakeholders. They typically include features such as voting, commenting, and tagging, as well as data analysis and reporting. Impact assessment tools are software solutions that help organizations measure the impact of their initiatives and projects. They typically include features such as goal setting, data collection, analysis, and reporting. Impact research about web-based IMS have become more popular in recent years. See Figure 5.

Fifth "evidence". Web-based idea management systems are tools used to capture, organize, and evaluate ideas from a variety of sources, such as employees, customers, and partners. These systems can help organizations to identify and prioritize ideas that could lead to new products, services, or processes. They can also help to identify trends and patterns in the data and provide evidence-based insights into the potential success of ideas. Additionally, these systems can provide a platform for collaboration and communication between stakeholders and can be used to track the progress of ideas and their implementation. Web-based idea management systems are software applications that allow organizations to capture, store, and track ideas from employees, customers, and other stakeholders. These systems are designed to help

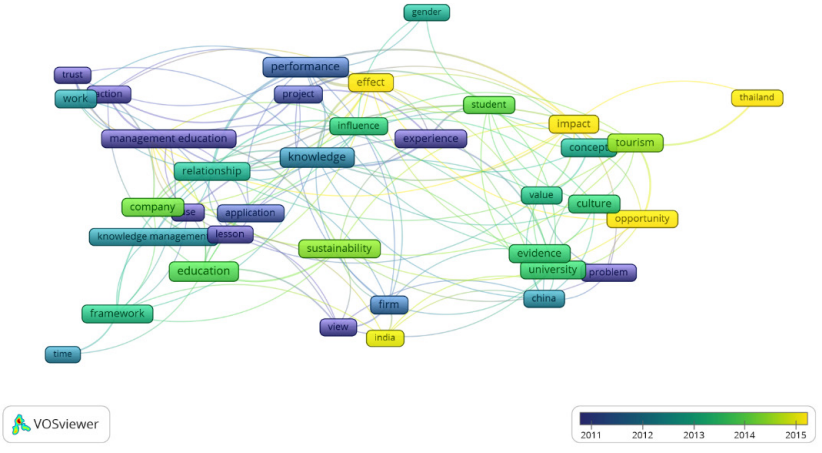

Figure 5. Network analysis results (year perspective) (source: the authors)

organizations identify, develop, and implement innovative ideas. Examples of web-based idea management systems include Brightidea, Spigit, and IdeaScale. Evidence of application of web-based idea management systems can be seen in the success stories of companies such as Microsoft, Dell, and IBM. Microsoft used an idea management system to develop their Xbox gaming console. Dell used an idea management system to develop their customer service system. IBM used an idea management system to develop their Watson artificial intelligence platform. All of these companies have seen success due to the implementation of their idea management systems.

Additionally, by analysing SCOPUS data with descriptive elements. There is growing interest to research these topics See in Figure 6.

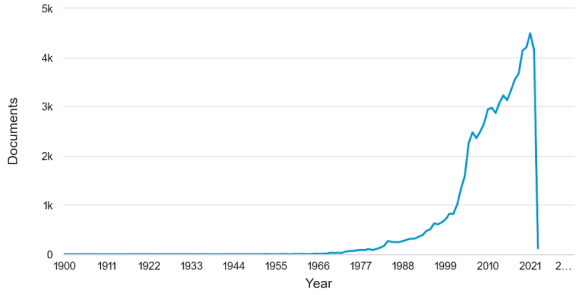

Figure 6. Documents by date (source: the authors)

Gretes contribution based on the number of the papers written in this area is by Anon, Carayannis, E. G., Aven, T. See in Figure 7.

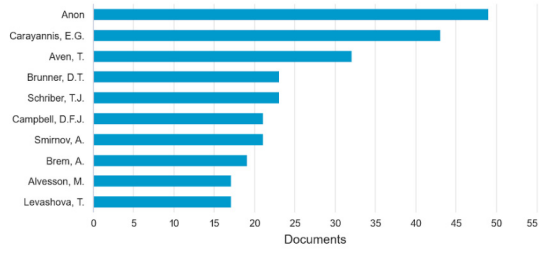

Figure 7. Documents by authors (source: SCOPUS)

And papers are mostly written by authors from USA or China. See in Figure 8.

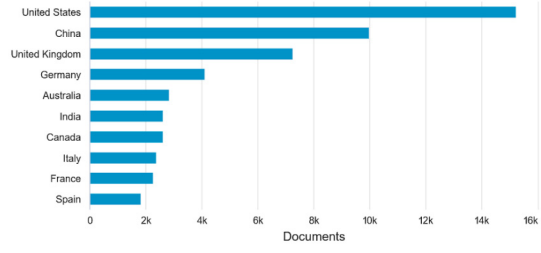

Figure 8. Documents by countries (source: SCOPUS)

Main subject areas for analysed documents are computer sciences, social sciences and business management sub-category. See in Figure 9.

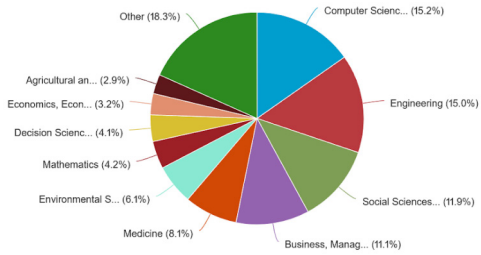

Figure 9. Documents by subject area (source: SCOPUS)

3.1.1. Idea management

Web-based information management systems (IMS) are software applications that enable users to manage and access data and information over the internet, rather than on a local computer or network. They are typically accessed through a web browser and do not require the user to install any specialized software or hardware. In addition to traditional IMS functions such as storing and organizing data, web-based IMS also enable users to collaborate and share information with others remotely. Web-based IMS are used for a wide range of purposes, including document management, project management, customer relationship management (CRM), and enterprise resource planning (ERP). One of the main advantages of web-based IMS is that they allow users to access and manage their data and information from any location with an internet connection, making them particularly useful for remote teams or organizations with multiple locations. They are also often more cost-effective than traditional on-premises systems, as they do not require the purchase and maintenance of specialized hardware or software. Visual collaboration platforms like Miro can also be integrated into web-based IMS as a tool for organizing and sharing information in a visual and interactive way.

IMS are designed to facilitate the process of IM, by providing a structured process for idea generation and evaluation, as well as a platform for communication and collaboration (Aagaard, 2012). They can be used to capture, store, and analyse ideas, and to provide feedback to the idea generators (Mikelsone et al., 2022a; Deichmann, 2012; Walton et al., 2016; Brem & Voigt, 2007; Gerlach & Brem, 2017). Additionally, IMS can be used to track the progress of ideas, and to provide insights into the effectiveness of the IM process (Saldivar et al., 2016).

IMS can be used to support the entire IM process, from idea generation to implementation. For example, IMS can be used to capture ideas, to evaluate them, to select the best ones, and to track their progress. Additionally, IMS can be used to facilitate collaboration and communication between stakeholders, to provide feedback to idea generators, and to provide insights into the effectiveness of the IM process.

In conclusion, IMS are tools that can be used to support the process of IM. They provide a structured process for idea generation and evaluation, as well as a platform for communication and collaboration. Additionally, IMS

can be used to track the progress of ideas, and to provide insights into the effectiveness of the IM process.

However, research has shown that web-based IMS can be used to foster creativity and collaboration. For example, web-based IMS can be used to facilitate brainstorming sessions, which can help to generate new ideas. Additionally, web-based IMS can be used to facilitate collaboration between teams, allowing them to share ideas and work together to develop them. Furthermore, web-based IMS can be used to provide feedback on ideas, allowing teams to refine and improve their ideas.

Overall, the increase in the number of commercially accessible web-based IMS is a positive development, as it provides organizations with the necessary tools to facilitate idea management. Web-based IMS can be used to foster creativity and collaboration and can provide organizations with the necessary support to develop and assess ideas.

3.1.2. Quadruple Helix

The Triple Helix innovation model is based on the idea that university-industry-government relations are the key to innovation and economic development (Medeiros et al., 2020; Nordberg et al., 2020; Hadiyanto et al., 2020). The Quadruple Helix adds the perspective of the media and culture, while the Quintuple Helix adds the perspective of the natural environment (Carayannis & Campbell, 2009; Mineiro et al., 2021). The Quadruple Helix Model, also known as the Quadruple Helix Model or simply the quad helix model, is a framework for innovation and problem-solving that involves the participation of four different groups or "helixes": academia, industry, government, and civil society (Roman et al., 2020; Hasche et al., 2020). The quad helix model seeks to facilitate collaboration and co-creation among these different stakeholders, with the goal of finding solutions to complex social and technological problems and driving innovation and progress.

The idea behind the quad helix model is that innovation and problem-solving are most effective when a diverse range of perspectives and expertise are brought to bear on a problem. Each of the four helixes represents a different sector of society, and by involving all four in the innovation process, it is possible to generate new ideas and solutions that are both practical and socially responsible.

The quad helix model has been applied in a variety of contexts, including in the development of new technologies and business models, the design of public policies, and the creation of social programs and initiatives. It is often used in situations where traditional top-down approaches to innovation and problem-solving are insufficient or ineffective, and where a more inclusive and participatory approach is needed.

Main method for Quadruple Helix research according to SCOPUS articles are case studies (Lohmann et al., 2021), that is the reason why this method will be applied also in this paper.

3.1.3. Quadruple Helix framework in web-based idea management context

Idea management is the process of collecting, evaluating, and implementing ideas from a variety of sources. It is a way for organizations to identify, develop, and implement new ideas that can improve their operations, products, and services. Quadruple Helix is a model of innovation that involves four key stakeholders: government, industry, academia, and civil society. This model emphasizes the importance of collaboration between these stakeholders in order to create an environment that is conducive to innovation. Quadruple Helix is based on the idea that innovation is a collective effort and that all stakeholders must work together to create an environment that is conducive to innovation. Quadruple Helix is often used to identify areas of collaboration and to develop strategies for innovation. It can also be used to identify opportunities for collaboration and to develop strategies for collaboration.

The Quadruple Helix model is a useful tool for understanding the role of stakeholders in the innovation process. It is based on the idea that innovation is a process of collaboration between four different types of stakeholders: government, industry, academia, and civil society. Each of these stakeholders has a unique role to play in the innovation process, and each has its own set of resources and capabilities that can be used to support the development of new ideas and products. By understanding the roles of each stakeholder, organizations can better identify potential partners, develop effective strategies for collaboration, and ensure that all stakeholders are working together to achieve a common goal. When it comes to idea management, the Quadruple Helix model can be used to identify potential partners and stakeholders, and to ensure that all stakeholders are working together to achieve a common goal. For example, government can provide resources and incentives for research and development, while industry can provide the necessary capital and expertise to bring ideas to fruition. Academia can provide research and development support, and civil society can provide input and feedback on the development of new products and services. By understanding the roles of each stakeholder, organizations can better identify potential partners, develop effective strategies for collaboration, and ensure that all stakeholders are working together to achieve a common goal.

In a web-based idea management context, the quad helix model can be used to bring together diverse perspectives and expertise from different sectors of society in order to generate and develop new ideas. For example, an organization could use a web-based idea management platform to gather and evaluate ideas from employees, customers, and other stakeholders, and then bring in expertise from academia, industry, government, or civil society to help refine and implement those ideas.

The quad helix model can also be used to ensure that new ideas are socially responsible and aligned with the values and goals of the organization and its stakeholders.

By involving all four helixes in the idea management process, it is possible to generate ideas that are both practical and socially responsible, and that have a greater chance of success.

Overall, the quad helix model can be a valuable approach to idea management and innovation in a web-based context, as it allows organizations to tap into the collective knowledge and expertise of a diverse range of stakeholders in order to generate and develop new ideas.

Based on the previously mentioned aspects authors have created a theoretical framework of Quadruple Helix approach in idea management context. See Figure 10.

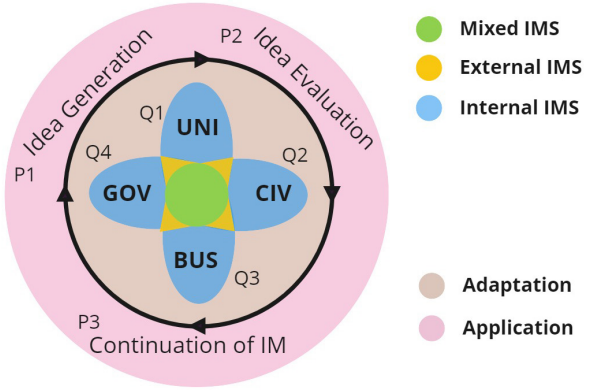

Figure 10. Quadruple Helix adaptation in idea management application (source: the authors)

Application elements include: P1 is idea generation process, P2 is idea evaluation, P3 continuation of IM. Adaptation elements include Quadruple Helix approach partners: Q1: universities, Q2: civilians; Q3: businesses; Q4: government. In Chapter 3.2. authors will highlight application of this framework.

Application elements:

P1: Idea generation is the process of creating new ideas, concepts, or solutions to a problem. It is a key part of the innovation process and is often used in business and research contexts. The Quadruple Helix Model is an innovation model that emphasizes the importance of collaboration between government, industry, academia, and civil society in order to foster innovation. This model is based on the idea that innovation is best achieved through the integration of different stakeholders and the sharing of resources. This model has been used to develop innovative solutions to a variety of challenges, including economic development, environmental sustainability, and social justice.

P2: The Idea Evaluation and Quadruple Helix Model is a framework for assessing the potential of a new idea or concept. It is based on the concept of the four helixes of innovation: government, industry, academia, and civil society. The model assesses the potential of an idea or concept by looking at how it is likely to be received and implemented by each of the four helixes. The model also looks at the potential for collaboration between the four helixes, as well as the potential for the idea to create positive social and economic impacts. This model can be used to assess the potential of a new idea or concept, and to identify potential areas for collaboration and improvement.

P3: The Quadruple Helix Model is an approach to innovation that brings together four key stakeholders: government, industry, academia, and civil society. It is based on the idea that the four stakeholders should work together to create an environment that is conducive to innovation. This model emphasizes the importance of collaboration between the four stakeholders and the need for a holistic approach to innovation. The Quadruple Helix Model is a useful tool for encouraging innovation and creating an environment that is conducive to it. It encourages stakeholders to work together to identify problems and develop solutions. It also encourages stakeholders to provide feedback to each other, which can help to identify areas for improvement and ensure that the innovation process is successful. This model also encourages stakeholders to share information and resources, which can help to create a more efficient and effective innovation process. Finally, the Quadruple Helix Model encourages stakeholders to engage in dialogue and debate, which can help to create a more open and collaborative environment for innovation.

Adaptation elements:

Q1: The Quadruple Helix approach to adaptation involves the collaboration of four key stakeholders: government, industry, civil society, and universities. Universities play an important role in this approach as they are responsible for providing research and education on adaptation strategies, as well as developing innovative solutions to climate change. Universities are also responsible for engaging with the other stakeholders to ensure a comprehensive and effective approach to adaptation. This includes providing technical advice, developing policy frameworks, and engaging in public outreach and education. Universities can also provide access to data and resources that can help inform and guide adaptation strategies. Finally, universities can help to build capacity and provide training to ensure that adaptation efforts are successful.

Q2: Society is responsible for raising awareness of climate change and its impacts, and for advocating for adaptation strategies. They are also responsible for engaging in activities that promote adaptation, such as public education campaigns and community-based initiatives (Han et al., 2022).

Q3: Industry plays a key role in developing and implementing adaptation strategies. They are responsible for developing and using new technologies and processes to reduce the impacts of climate change.

Q4: Governments are responsible for setting the legal and regulatory framework for adaptation. They are also responsible for providing the necessary funding and resources to support adaptation initiatives.

Theoretically web-based idea management application could be used to connect existing EU and international cohorts of relevance to COVID 19. This would allow for

the sharing of ideas and best practices between different groups not only to help to improve the response to the outbreak.

3.2. Case study

This case study provides a detailed description of the Think Uncommon Collaborative Creation Workshop and the use of web-based idea management systems in a Quadruple Helix context, including the roles of adapted web-based IMS Miro and Figma in facilitating communication and coordination among stakeholders. It also includes information about the challenges and successes of the workshop and the importance of experienced coordinators in complex project management using collaborative information management systems.

The Think Uncommon Collaborative Creation Workshop was a complex project that required the coordination of numerous stakeholders from various sectors, including the embassy, university, civil, and business sectors. To facilitate communication and coordination among these stakeholders, the organizers utilized the Miro platform as a web-based idea management system (IMS). In this case networking of existing EU and international cohorts during COVID-19.

The Think Uncommon Collaborative Creation Workshop was a project organized by a collaboration between the French Institute in Latvia, the Goethe-Institut Riga, and Riga Technical University (RTU) in partnership with Innovation Space Moberg's Studio and Creative Education Platform SIA C2D. It was supported by the Franco-German Cultural Fund and aimed at engaging Latvian artists and technicians in interdisciplinary and inter-professional creative thinking, with the mentorship of experts from France, Germany, and Latvia.

The workshop took the form of a short and intense three-day event, during which multidisciplinary participants worked in teams to create a project centred on the theme of "Common Future." The goal of the workshop was to promote networking among actors in the cultural and creative industries in Latvia, highlight the creativity of Latvian artists and technicians, and facilitate the creation of emerging projects while also addressing important contemporary topics.

The workshop program was divided into four key moments: a meet and greet between participants and organizers and mentors, free creation time in teams, and a prototypes' exhibition as the closing event. The participants, who were students, were tasked with creating an art exhibition in just three days with the help of mentors. The tight timeline for project realization made the use of an adapted web-based idea management system (IMS) such as Miro crucial to the success of the workshop.

To ensure coordination between all partners, the workshop organizers utilized Miro as the primary platform for communication and idea sharing. Miro is a collaborative shared whiteboard platform that allows users to share ideas, communicate, and track progress on projects in real-time. It was chosen as the primary platform for planning the workshop because of its versatility and ability to support visual communication and comprehensive structuring of information.

During the planning of the series of workshops, the Miro coordinator played a crucial role in ensuring that all involved parties from embassy institutes, university representatives, business partners and civil partners (participants) were able to effectively share ideas and deliverables within the tight project timeline. The coordinator, who was an architecture study graduate with experience in the construction industry, was well-versed in the use of collaborative information management systems and drew inspiration from building information modelling (BIM) methodologies to visually structure the information on the Miro board. In addition to Miro, the organizers also utilized the Figma platform for collaborative art asset generation. The use of Figma allowed the team to rapidly communicate with the artists and easily create and share art assets and design elements, contributing to the success of the workshop.

The use of Miro and Figma proved to be invaluable tools for facilitating communication and coordination among the various stakeholders involved in the workshop. The ability to share ideas and assets in real-time, along with the visually comprehensive structure provided by the Miro coordinator, allowed the organizer team to efficiently plan and execute the workshop within the tight deadlines.

However, it is important to also consider the potential risks and considerations of adapting existing cloud-based IMSs such as Miro and Figma. One potential risk of utilizing these types of platforms is the dependence on internet connectivity and the potential for technical difficulties or downtime. It is important for organizations to have contingency plans in place in case of any issues with the platform. Additionally, there may be concerns about data security and the potential for unauthorized access to sensitive information. It is crucial for organizations to carefully review the terms of service and privacy policies of any IMS they choose to use, and to implement appropriate security measures to protect their data. During the Think Uncommon Collaborative Creation Workshop, a hybrid approach for idea management in a Quadruple Helix context was formed through the use of adapted web-based IMSs such as Miro and Figma. Some specific steps that contributed to the success of this approach included:

1. Utilizing Miro as the primary platform for communication and idea sharing: Miro allowed all stakeholders, including participants, organizers, and mentors, to share ideas and track progress on projects in real time, facilitating coordination and communication among the various parties involved.

2. Structuring the information on the Miro board in a visually comprehensive manner: The Miro coordinator, inspired by BIM methodologies, used graphical representations of the project timeline and other visual aids to

structure the information on the Miro board, allowing for the integration of both Kanban and waterfall systems and enabling the team to track progress and identify potential bottlenecks in the project.

3. Utilizing Figma for collaborative art asset generation: The use of Figma allowed organizers representing a wide pool of government related, private, business and civil partners to easily create, validate and share art assets and design elements, contributing to the success of the workshop.

4. Implementing appropriate security measures: To protect sensitive information and ensure data security, the organizers carefully reviewed the terms of service and privacy policies of the IMSs they used and implemented appropriate security measures.

See improved framework in Figure 11.

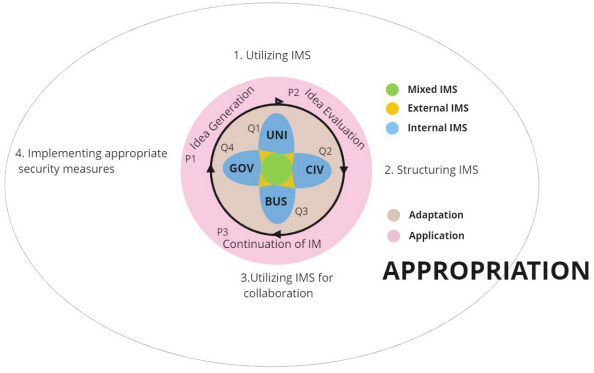

Figure 11. Quadruple Helix adaptation in idea management application (source: the authors)

Overall, these steps helped to utilize adapted web-based IMSs effectively in the Quadruple Helix context of the Think Uncommon Collaborative Creation Workshop, facilitating communication and coordination among the various stakeholders involved and contributing to the success of the project.

In conclusion, the Think Uncommon Collaborative Creation Workshop was a successful project that demonstrated the importance of effective idea management in the coordination of complex projects involving multiple stakeholders. The use of Miro and Figma as adapted web-based IMSs facilitated rapid real-time communication and idea sharing among the various partners, enabling the teams to efficiently plan, ideate, evaluate and adapt to different scenarios presented by the workshop specifics.

Overall, the use of Miro and Figma as web-based idea management systems during the Think Uncommon Collaborative Creation Workshop demonstrated the importance of effective idea management in the successful organization of complex projects. These platforms proved to be valuable tools for facilitating communication and coordination among the various stakeholders involved, however it is important for organizations to carefully consider the potential risks and considerations of adapting cloud-based IMSs.

Additionally, how created framework materializes in this case:

Application elements:

P1 idea generation process – criteria. P2 is idea evaluation – criteria, how the process is organized;

P3 continuation of IM.

Adaptation elements:

Q1: universities – Riga Technical University Science and Innovation Centre;

Q2: civilians – event participants;

Q3: businesses – mentors and organizer company;

Q4: government – represented by The French Institute in Latvia and Goethe-Institut Riga.

The whole case study ideation event was organized in 2 stages:

1st stage – Administrative – Event coordination – main partners Q1, Q3 and Q4;

2nd stage – Practical level – Participants ideas and creation of the exhibition – main partners Q1, Q2, Q3 and Q4.

In the first stage of the ideation process for this case study, the organizers held ideation sessions focused on the organization and coordination of the event. These sessions were structured around the use of Miro, a digital whiteboarding platform, which allowed the organizers to brainstorm and collaborate on ideas in real-time. During the first stage Idea generation was coordinated by Q1 and Q3, evaluation by Q4, continuation by Q2 through submitting recommendations during the event registration form.

For example, during these sessions, the organizers used visual collaboration boards Miro and Figma.com to create a visual representation of the event timeline, including tasks such as securing a venue and selecting mentors,

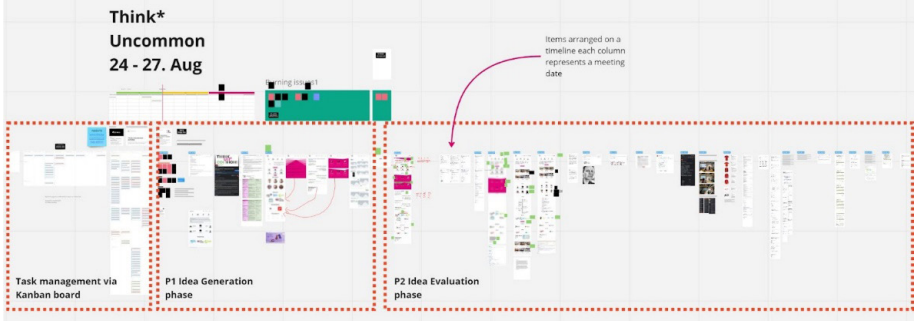

Figure 12. Phases of IM in the case (source: the authors)

website concept iterations and keeping track of invoices and assigned tasks. The use of Miro in these ideation sessions allowed the organizers to capture and organize their ideas in a visual and interactive manner, facilitating the collaborative nature of the process. Idea generation and evaluation was structured linearly by grouping iterations by date (blue markings). See in Figure 12.

The second stage of the ideation process was more focused on the participation of businesses and civil society (participants). During this stage, participants worked in teams with mentors to create a pop-up art exhibition over the course of two days. Traditional in-person methods were widely used during this phase using post it notes, flipchart brainstorming and round circle discussions, Airtable.com cloud data management platform was also used for tracking participants progress on idea realization and the budget and use of inventory during these sessions. All stakeholders came together for the exhibition opening, showcasing the results of the ideation process. Overall, the structure of the ideation process for this case study involved the collaboration of various stakeholders, with the first stage focusing on government and university representatives and the second stage involving businesses and civil society. The use of both traditional and digital methods facilitated efficient and effective collaboration and organization, leading to the successful creation of the pop-up art exhibition. Practical implementation see in Figure 13.

4. Discussion

There is an ongoing discussion in the fields of stakeholder and information management about the various approaches and – web-based – tools that can be used to enhance and support collaboration.

One current trend is the increasing adoption of cloud-based systems and tools, including web-based information management systems (IMS) and visual collaboration platforms like Miro. These tools offer a number of benefits, including the ability to access and manage data and information from any location with an internet connection, and the ability to facilitate real-time collaboration among team members and stakeholders.

There is also a growing recognition of the importance of involving diverse perspectives and expertise in the information management and collaboration process, as exemplified by the Quadruple Helix framework of innovation. This is leading to a focus on approaches that involve the participation of multiple stakeholders, such as co-creation and open innovation.

In terms of the growth of visual collaboration boards, there is a general consensus that these tools are becoming increasingly popular and important in a variety of contexts, including project management, knowledge management, customer relationship management (CRM), and collaborative brainstorming. The ability of visual collaboration boards to facilitate the capture, organization, and sharing of information and ideas in a visual and interactive way is seen as a key reason for their growing importance.

Level of Collaboration and Community

In IM adaptation should be discussed *level of collaboration:* solo collaboration- this type of collaboration is characterized by users working independently on projects; collaborative collaboration – this type of collaboration is characterized by users working together on projects. *Level of community* (Tausczik & Wang, 2017): closed community – this type of community is characterized by users who are all known to each other and who share a common interest; open community: this type of community is characterized by users who are not all known to each other and who do not share a common interest. In future research also factors of satisfaction and dissatisfaction should be researched (Nguyen & Marques, 2022).

Improving the value-of-input for ideation by management intervention (Aalbers & Dolfsma, 2017) not only in intra-organisation but also in external and mixed environments could be great research subject for future studies. This perspective in this paper is included only from structuring and utilizing perspectives, but not highlighted from value-of-input perspective. Ideation is a powerful tool that

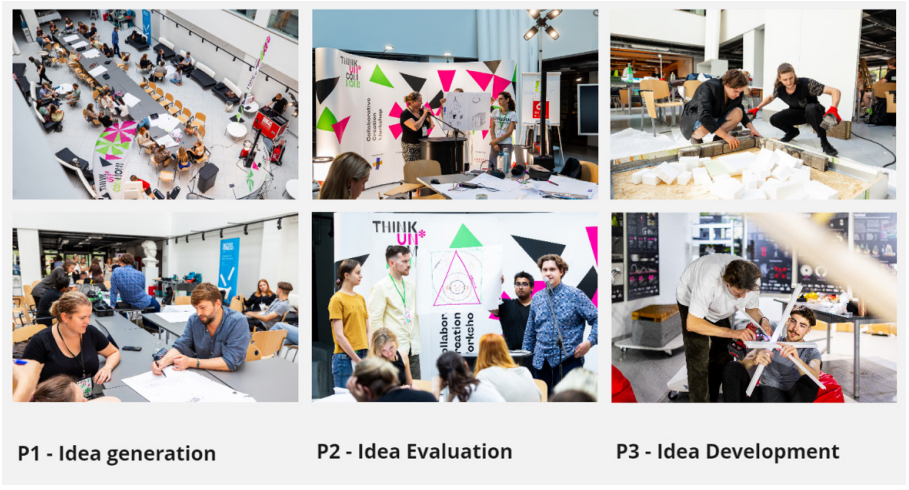

Figure 13. Practical implementation of the created logic (source: the authors)

can be improved with management intervention by increasing the value of input. Management can increase the value of input by providing employees with the resources they need to be creative, such as time, money, and space. In addition, management can create an environment that encourages creativity and rewards employees for their ideas.

Process versus Results. In this paper authors include perspectives from process aspects and partners as application and adoption elements. But not from end result perspective or process result perspective. In future studies also perspective of engagement and retention levels (Gallmeister & Lutz, 2016) could be included or other assessment elements (Paskaleva et al., 2021).

Sequencing of Application element methods? How to sequence IM methods to get the best results in different adaptation modes could bring great practical implications (Mikelsone et al., 2022a). There is no one-size-fits-all answer to this question, as the best way to sequence idea management methods will vary depending on the specific organization and its needs. However, a good way to sequence idea management methods could involve starting with a brainstorming session to generate a large number of ideas, then using a voting or ranking system to narrow down the list of ideas, and finally using a decision-making process to select the best idea.

How to manage rewards in different adaptation modes of Quadruple Helix Model? Governance of Web-Based Idea Management System Rewards is a very important topic for research. Till now only open innovation perspective in limited area is researched (Mikelsone et al., 2022b). In order to manage rewards in different adaptation modes of Quadruple Helix Model, following approach can be suggested:

1. Define reward system criteria: Before designing a reward system, the organization should define its criteria for rewards. The criteria should be based on the organization's goals and objectives.

2. Design a reward system: After the criteria are defined, the organization can design a reward system that meets its needs. The reward system should be fair and equitable and should motivate involved parties to achieve the organization's goals.

3. Implement the reward system: Once the reward system is designed, the organization should implement it. The reward system should be communicated to involved parties and they should be given guidelines on how to earn rewards.

4. Evaluate the reward system: The organization should periodically evaluate the reward system to ensure that it is meeting its objectives. The evaluation should include feedback from involved parties and should be used to make changes to the reward system if necessary.

5. Conclusions

5.1. Theoretical and practical implications

Article provides description potential of web-based idea management application in Quadruple Helix context in networking of existing EU and international cohorts of relevance to COVID-19.

Authors have created Quadruple Helix Adaptation in Idea Management Application Framework by including elements such as: Application elements includes: P1 is idea generation process, P2 is idea evaluation, P3 continuation of IM; Adaptation elements includes Quadruple Helix approach partners: Q1: universities, Q2: civilians; Q3: businesses; Q4: government.

The described framework successfully demonstrates the effective use of a web-based idea management application within the Quadruple Helix context. The adaptation of Miro and Figma, along with the active involvement of government, industry, academia, and civil society, showcases a robust approach to addressing complex challenges such as organizing a collaborative creation workshop. The structured ideation process, incorporating diverse stakeholders, resulted in a successful project, emphasizing the importance of effective idea management in complex, multi-stakeholder initiatives. The networking of existing EU and international cohorts relevant to COVID-19 involves connecting and collaborating with diverse groups, organizations, and stakeholders to address the challenges posed by the pandemic.

Theoretical contribution. The research provides a general model for web-based IMS applications with the Quadruple Helix approach. It provides a comprehensive overview of web-based IMS application types in the professional practices, which can help companies to understand how they can apply web-based IMS and the key aspects they need to consider in their application of a specific IMS and its type. Finally, the research provides a structured approach to the different IM models through the Quadruple Helix approach, which will help to identify the multidimensional context of web-based IMS.

It reveals the potential of web-based idea management application in Quadruple Helix context in networking of existing EU and international cohorts of relevance to COVID 19.

The practical contribution of the research results helps to understand how to apply web-based IM in Quadruple Helix model context. This paper provides managers with a richer set of theoretical tools, letting them make better decisions regarding the application adaptation of IM that is the best for achieving the results in a context.

5.2. Limitations

The study is based on a single case study which might not be generalizable. In future studies, other cases should be included to increase the generalizability of the findings.

Limitations to share information about case study in details about created results.

The main limitations based on the basic research approach are discussed below.

Issues with selection of the very specific case study in creative industries. In future studies, also other industry cases should be included.

Regarding the lack of previous research studies on the topic, depending on the specific research topic, prior research studies that apply to the paper are limited. Here, it can be considered an important opportunity, presenting a gap with the need for further development in the study.

Time constraints negatively affected the study because it does not provide the possibility of dynamics. Therefore, a future study – a longitudinal study – is needed to address this limitation.

5.3. Future research directions

As a result, the findings of this research contribute to the creation of this integrated framework, and therefore are subject to further research. In further studies, the authors plan to involve subject matter experts in improving the reliability and generalisability of the model because at the moment it is tested and validated in this one case study.

How different Quadruple Helix Model participants impact web-based IM results? And how good stakeholder management procedures need to be implemented?

The different Quadruple Helix Model participant impacts web-based IM results by providing different levels of access, control, and privacy. The government can access and control the web-based IM system, while the businesses can access and control the system but cannot see the messages between the government and the citizens. The citizens have the most access to the system, but the least control over it. These elements should be included in future research directions. It could be researched in connection with different web-based IM business models

There are a few possible ways to look at how the different Quadruple Helix Model participants impact web-based IM results. The first way is to look at how the different groups impact the overall quality of the IM system. The second way is to look at how the different groups impact the overall functionality of the IM system. The third way is to look at how the different groups impact the overall security of the IM system. And the fourth way is to look at how the different groups impact the overall performance of the IM system.

Each of these ways of looking at the impact of the different groups on the IM system results requires different stakeholder management procedures. The first way, looking at the impact of the different groups on the overall quality of the IM system, requires procedures for ensuring that all of the groups are working together to create a high-quality IM system. The second way, looking at the impact of the different groups on the overall functionality of the IM system, requires procedures for ensuring that all of the groups are working together to create a system that functions well. The third way, looking at the impact of the different groups on the overall security of the IM system, requires procedures for ensuring that all of the groups are working together to create a system that is secure. And the fourth way, looking at the impact of the different groups on the overall performance of the IM system, requires procedures for ensuring that all of the groups are working together to create a system that performs well.

Quadruple Helix Model and Open and Closed Innovation Contexts?

According to the logic of the Quadruple Helix Model is most applicable in open innovation contexts (Chesbrough & Bogers, 2014; Bagherzadeh et al., 2020; Zobel, 2017; Gajdzik & Wolniak, 2022), where businesses, governments, and citizens are working together to create new products and services. In closed innovation contexts, where businesses work alone to create new products, the Quadruple Helix Model is not as applicable. But nowadays more and more companies apply both contexts. There is no one-size-fits-all answer to this question, as the Quadruple Helix Model and open and closed innovation contexts can be used in different ways to achieve different outcomes. However, in general, the Quadruple Helix Model can be used in open innovation contexts to encourage collaboration between different stakeholders, while closed innovation contexts can be used to protect intellectual property and encourage innovation within a single organization. Open data ecosystems (Kitsios et al., 2021) in web-based IMS context could be very promising research direction.

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Author contributions

For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used "Conceptualization, Mikelsone, E.; methodology, Mikelsone, E.; software, Babris, M.; validation, Babris, M. and Mikelsone, E.; formal analysis, Mikelsone, E.; investigation, Mikelsone, E.; resources, Babris, M.; data curation, Mikelsone, E.; writing – original draft preparation, Mikelsone, E.; writing – review and editing, Mikelsone, E., Babris, M., Segers, J. P., Babre, A. M.; visualization, Beitane, A., Babris, M., Babre, A. M.; supervision, Segers, J. P.; project administration, Mikelsone, E.; funding acquisition, Mikelsone, E. All authors have read and agreed to the published version of the manuscript." Please turn to the CRediT taxonomy for the term explanation. Authorship must be limited to those who have contributed substantially to the work reported.

Disclosure statement

The authors declare no conflict of interest.

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