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DIGITALISATION, KNOWLEDGE MANAGEMENT AND TECHNOLOGY TRANSFER IMPACT ON ORGANISATIONS' CIRCULARITY CAPABILITIES*

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Abstract. Transition to circular economy (CE) requires that organisations change the way they do activities. Through digitalisation the information flow can be improved across all the value chain. The information that is particularly relevant for CE needs to be created in the first place and shared within the organisation and among them to implement CE strategies. Implementation of CE strategies requires that organisations has the ability to access technologies through technology transfer to achieve higher co-operation levels. Circular processes can be defined as those processes within organisations that positively contributes towards CE principles implementation, such as re-using or recycling products and materials. Within this article knowledge management (KM), digitalisation, and technology transfer (TT) are analysed through systematic literature review to understand the impact of these three concepts on organisations capabilities to develop circular processes. The knowledge management theory demonstrate the need for higher attention on how within organisations and between organisations CE related information could be managed to achieve CE strategies for organisations and their networks, such as supply chain. Technology transfer ensures that there are pathways to transfer relevant technologies that can improve or enable CE processes to multiple organisations through open source or conditional transfers. A concept based on a literature review is proposed on how digitalisation facilitates knowledge management within & among organisations, improves decision making of circular processes, and enables CE strategies implementation.

Keywords: circular economy; digitalisation; technology transfer; knowledge management; circular processes

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1. Introduction

Organisations and governments are faced with the challenges of rapidly increasing production and consumption of goods. With a huge amount of resources needed to support markets demand the sustainability boundaries are being challenged. The raw materials extraction, usage of fossil fuels, waste generation, etc. are the issues that Circular Economy (CE) address (Jabbour et al., 2018). In practice, to ensure CE implementation organisations needs to adapt their strategies and processes for developing and maintaining circular processes. The circular process can be defined as the actions and steps within an organisation that ensure the CE strategies, such as repair, design for circularity, etc. can be achieved by the supply chain. A difficult task for organisations is to find solutions for implementing such strategies when the supply chains are global, there is an increasing amount of varieties of products, etc. The developments of digital technologies enable such solutions through new business models, new processes, and optimisation opportunities for organisations function areas such as sales, marketing, procurement, etc. (Yadav et al., 2020). IoT, blockchain, Cloud computing, all these technologies that are transforming industries can be exploited for the circular processes development. With the increased exchange of explicit knowledge and co-operation-based developments the circularity gap can be closed (Cesur et al., 2020). With the increased options for organisations to manage their operations, develop strategies, and new business models there is a need to understand what are the impacts of digital technologies, knowledge management, and technology transfer in the context of organisations and their networks CE ecosystem.

The research goal of this article is to do a systematic literature review of digitalisation, knowledge management, and technology transfer impact for the organisations capabilities to develop circular processes. The object of the research is organisations and their capabilities to develop circular processes. To achieve the goal following research questions (RQ) are formulated:

1. What is the impact of digitalisation on the organisations capabilities to develop circular processes?
2. What is the impact of knowledge management on the organisations capabilities to develop circular processes?
3. What is the impact of the technology transfer on the organisations capabilities to develop circular processes?
4. How digitalisation can facilitate knowledge management and technology transfer for organisations capabilities to develop circular processes?

To answer the first 3 research questions systematic literature review will be used. To answer the fourth research question literature synthesis from the findings of the first three research questions will be used. Research objectives are:

1. To analyse the impact of digitalisation on the organisations capabilities to develop circular processes.
2. To analyse the impact of knowledge management on the organisations capabilities to develop circular processes.
3. To analyse the impact of technology transfer on the organisations capabilities to develop circular processes.
4. To propose concept how digital technologies facilitate knowledge management and technology transfer for organisations capabilities to develop circular processes.

2. CE, digitalisation and main theories

Circular economy surfaced from ecological and environmental economics and industrial ecology (Ghisellini, Ciacalani, & Ulgiati, 2016; Chehabeddine, Grabowska & Adekola, 2022). Academia and practitioners turned to CE when high production and consumption rates challenged resource scarcity and climate change. With limited resources available in the world recycling, reuse, using renewable materials, and other CE strategies are becoming a must objective for organisations to align with. The alignment with the CE principles requires organisations to adopt circular business model components, such as reverse logistics, and need to address CE strategies (Pieroni, McAloone, & Pigosso, 2020). It enables companies to think of new ideas, products, services, etc., within the context of CE and how to deliver the added value to customers and end users through a circular supply chain. There is a

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strong requirement of collaboration from organisations networks (supply chains, clusters, etc.) to develop circular processes that can support and implement CE strategies. Not only organisations, but overall cities adopt CE principles (Farelnik, 2021; Napiórkowska-Baryła & Świdyńska, 2021). It is an challenge how CE should be managed in a optimized way when it involves multiple stakeholders.

It would be difficult to find an organisation that was not impacted by digitalisation. From physically written information transition to a virtual environment to decision making based on real-time data, organisations managers can increase their capabilities in performing everyday tasks. Data and value that is given from analysing it require organisations to adjust their business models (Ritter & Pedersen, 2020). Digitalisation supports business processes and is an enabler for digital transformation - the restructuring of the business model. The impact on business from digitalisation results in better marketing, improved strategic planning, and control (Truant et al., 2021). The adoption of digital technologies requires organisations to have employees with adequate competencies, investment capabilities, technological solutions, etc. (Nagy et al., 2018). Within the context of CE digitalisation could allow higher co-operation with the supply chain, partners, and various other stakeholders. The information generation and sharing flexibility could be a significant factor for developing the circular processes to support CE strategies.

Knowledge management allows organisations to improve competitiveness by utilising the knowledge to deliver new value propositions for customers, improve processes, create new products, etc. The main two dimensions for the knowledge management activities are enablers and processes (Bessant & Francis, 2005). Enabling mechanisms allow knowledge to be shared by individuals, teams, etc. It facilitates knowledge creation, sharing, adoption, and so on. The processes deal with how the knowledge is created, how it is shared, how it is stored, applied, etc. (Santoro et al., 2018). In the context of CE, knowledge management can enable to connect downstream and upstream supply chain organisations for collaboration on the CE strategies design.

Kogut and Zander were among the first ones to link the knowledge-based theory with competitive advantage (Wahab et al., 2009). Tacit type of knowledge, which is based on people's skills, competencies, know-how, etc., is difficult to transfer. Through socialising tacit knowledge can be passed on to another person. By receiving the tacit knowledge through socialising person can create new knowledge that could potentially lead to the generation of explicit knowledge. Explicit knowledge, based on software, hardware technologies, documents, procedures, etc. is the core of the technology transfer. Explicit knowledge is easier to transfer compared to tacit knowledge. To generate explicit knowledge, which can be used by organisations to improve their competitiveness, tacit knowledge is required. In the ecosystem of CE explicit knowledge allows organisation to develop strategies and processes to enable CE strategies. In this ecosystem, the roles of technology transfer and transferee are important for establishing CE strategies. Their management through digital technologies could foster the progress for adapting or creating new value chains in order to adress CE strategies.

In this paper organisations capabilities to develop, maintain and design circular processes are the main object. The surrounding concepts of knowledge management, technology transfer, and digitalization are supporting pillars of organization and its network CE ecosystem that enables new opportunities for circular processes development.

3. Methodology

Literature on the digitalisation, knowledge management, and technology transfer impact on organisations capabilities to develop circular processes will be investigated. For this purpose “Web of Science“ database will be used. The articles were searched with the following keywords:

- “Technology transfer” AND recycling,
- OR “Knowledge management” AND recycling,
- OR “Knowledge management” AND circular supply chain,

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- OR "Knowledge management" AND circular economy,
- OR "Technology transfer" AND circular economy,
- OR digit* AND circular supply chain.

The recycling keyword was used to identify which articles mention one of the most relevant CE strategies. Downcycling, high-efficient recycling, downgrading, etc. are some of the possible ways to address recycling in the CE ecosystem. With the dominant practices of materials and products quality degrading after recycling this is one of the most important topics to address from the CE perspective. To understand what role knowledge exchange takes in the recycling field of CE technology transfer and knowledge management were combined with the keyword "recycling".

The circular supply chain keyword was used to filter articles that have content related specifically to supply chain. The networks of multiple organisations within CE strategies implementation are important, therefore the supply chain keyword was combined with knowledge management and digitalisation. Due to the significant amount of articles available the digitalisation keyword was combined with circular supply chain instead of circular economy to narrow down suitable articles that could address the research questions. Digit* was used to include digital, digitalisation, digitisation keywords from the literature. The keyword of the circular supply chain was not combined with technology transfer as there is a low amount of literature dealing with the CE and the concepts of technology transfer. Therefore, the broader term of circular economy was used as an additional keyword in the combination with "Technology Transfer".

The presence of the digitalisation, KM and TT topics in the articles is required to answer RQ4. Therefore, the latest literature was decided to focus on this research as CE is a relatively new model. The date range of the articles was chosen from 2018 till 2021-10-16. The search resulted in **N (number of articles) = 340**. The following further elimination of the articles based on various factors were done:

1. Include only articles that are in the journals: **N = 152**. This criterion resulted in the further selection of only 152 articles. This criterion was used to ensure the higher quality of the papers to be used in this research.
2. Citations above 2: **N = 76**. The citation criterion is included to filter articles based on their relevance in the scientific community.
3. The next step was to screen abstracts with the following criteria's:
    3.1 To understand whether there is a connection with the CE, technology transfer, knowledge management, or digitalisation: **N = 71**. The criterion was used to eliminate articles that were not focusing on the relevant topics of this research paper or the connection to them was indirect.
    3.2 To eliminate technical reports: **N=63**. This criterion was chosen to filter out articles that deal mainly with technical solutions.
    3.3 To eliminate articles that do not address at least one of the RQ (1-3): **N=50.** The criterion was used to eliminate articles that had no implications or suggestions of what impact digitalisation, knowledge transfer, or technology transfer makes on the organisations capabilities to develop circular processes.
4. The final selection of papers was done through screening of the articles. 7 articles were eliminated which resulted in a total of **43** research articles to be used for this research article. The final selection of papers was based on the lack of results or conclusions that would allow finding answers for this research article's research questions. Figure 1 summarise the selection process of the articles.

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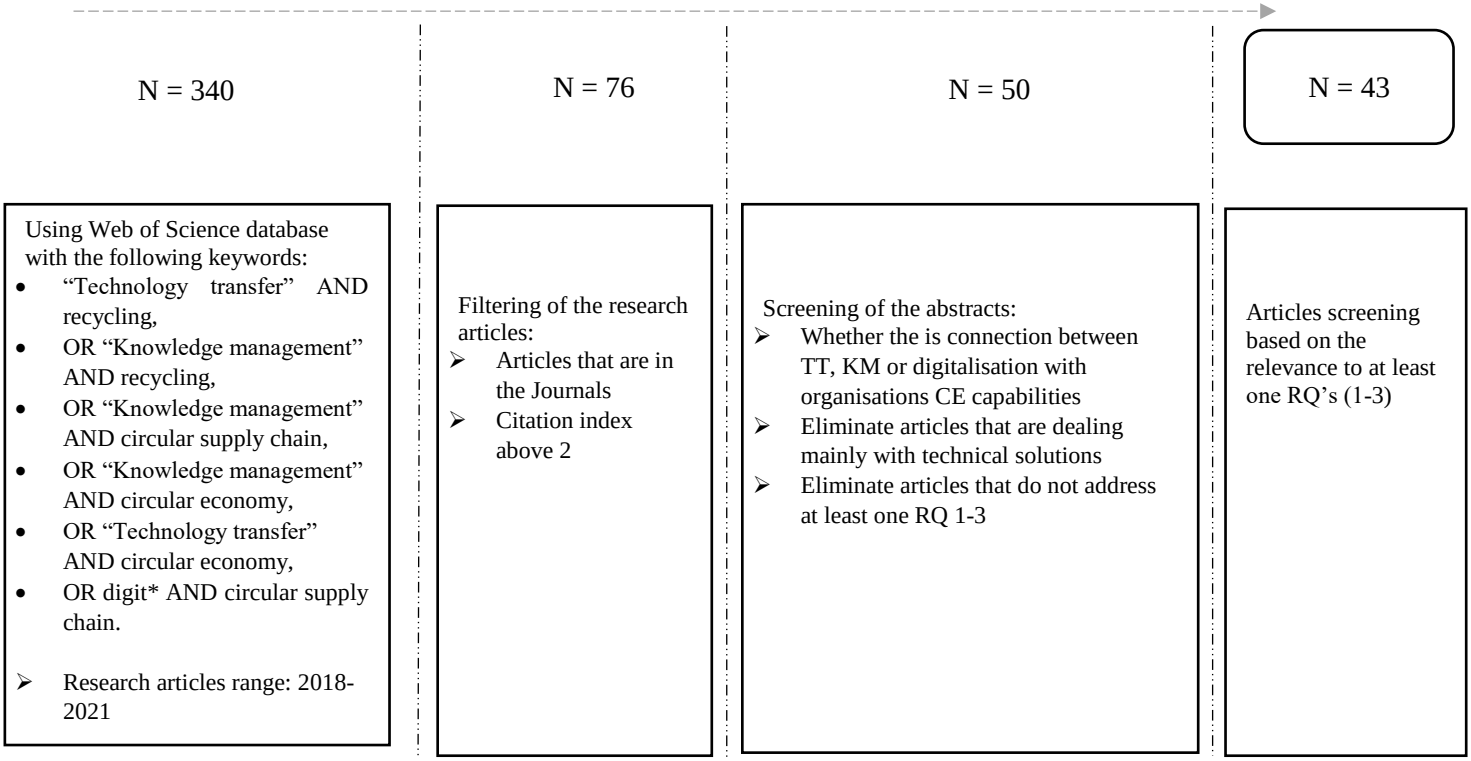

Figure 1. Selection process of the research articles
Source: made by authors

In total 43 research articles were chosen for this research. The following analyses are made based on which RQ's articles address, the year of the articles, in which journal articles are published, what theories are used in the article, and what research methods were used. Figure 2 shows the dispersion of the articles based on which research questions they address. Most of the articles were related to RQ 1 (18 articles), followed by RQ 2 (8 articles) and RQ 3 (3 articles). 11 articles address both, RQ 1 & RQ 2 whereas RQ 1 & RQ 3 are addressed together in 3 research articles. To answer RQ 1-3 research articles were grouped into 3 categories: digitalisation (RQ 1, 22 articles), knowledge management (RQ 2, 15 articles), and technology transfer (RQ 3, 6 articles). Articles that address more than 2 RQ's (14 articles) were appointed to only one type of the three categories. This process was based on which RQ the research article addressed mainly.

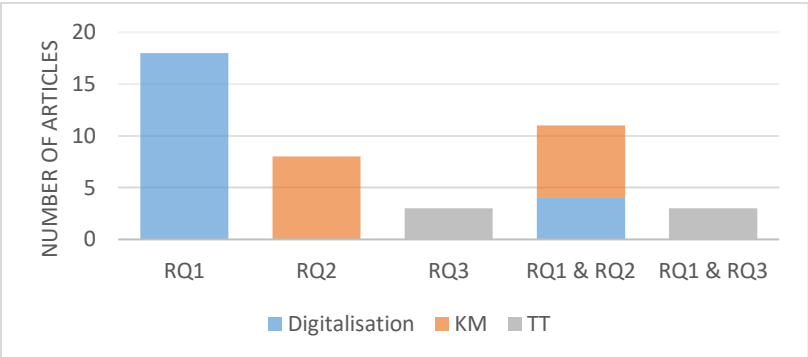

Figure 2. Dispersion of the articles based on which research questions they address
Source: made by authors

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Figure 3 shows the year of publishing of the articles. Most articles were published in 2020 with the least in 2018.

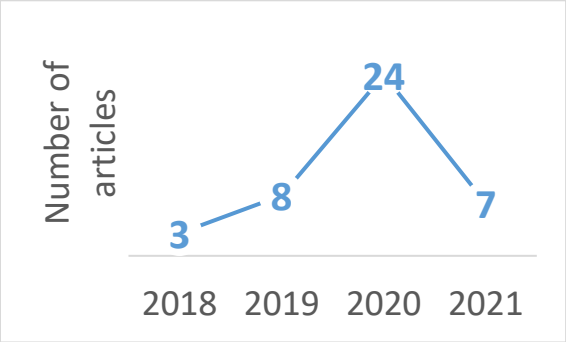

Figure 3. Number of articles based on their publishing year
Source: made by authors

Figure 4 shows which theories were used in the analysed research articles. The most used theory in the reviewed research articles that address RQ 1-3 is the resource-based view. Within the reviewed articles that are linked to RQ 3, there were no theories used.

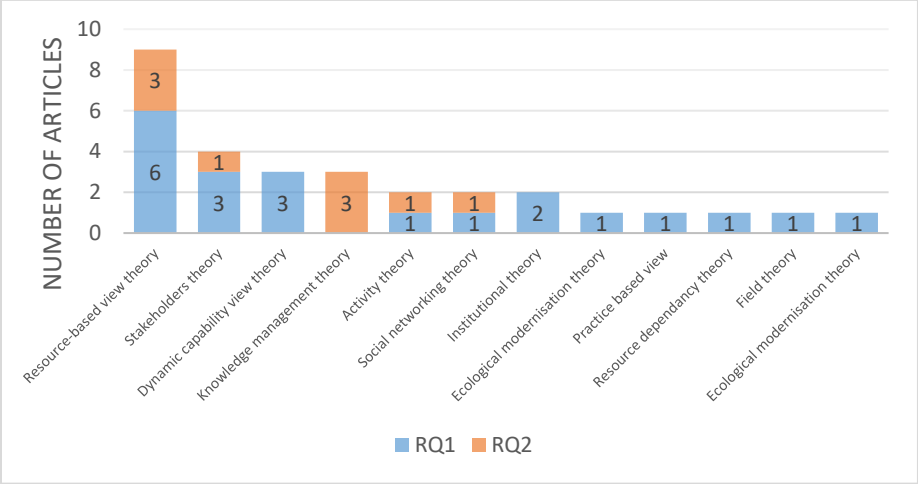

Figure 4. Used theories in the research articles that are related to RQ1 & RQ2
Source: made by authors

Figure 5 demonstrates the research methods (to collect the data or information) that were used within the analysed research articles. Literature review and case study were the most used methods in the analysed articles.

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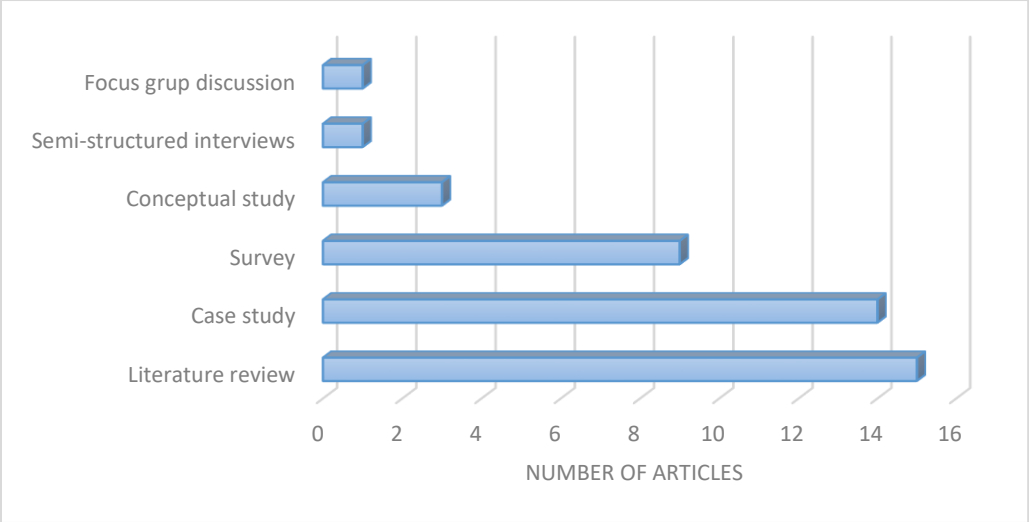

Figure 5. Type of the research methods used in the analysed articles
Source: made by authors

Figure 6 shows the distribution of the articles based on the journals they were published in. Sustainability (Switzerland); Journal of Cleaner Production; Resources, Conservation, and Recycling, and Industrial Management and Data Systems and Sustainable Production and Consumption journals had more than 1 article.

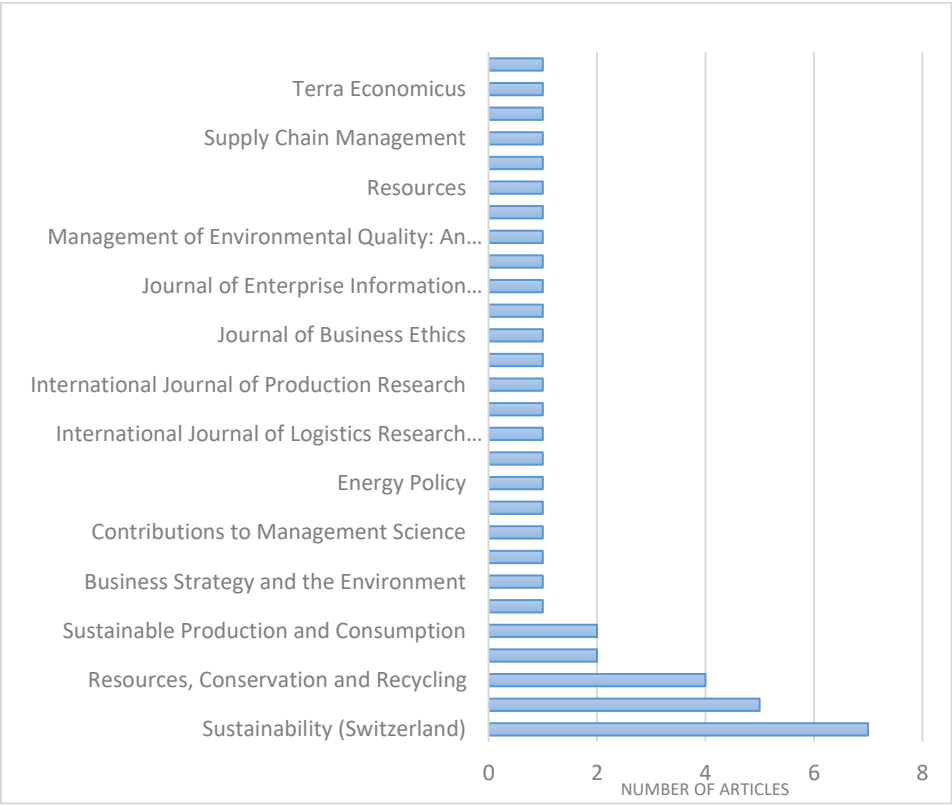

Figure 6. Journals of the selected papers
Source: made by authors

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43 research articles will be used further to analyse their content. Three categories of the articles based on the first three research questions will be reviewed in the following section.

4. Findings of the articles review

To answer the research questions selected articles (43 articles) will be analysed. Each of the following thematic findings based on the research questions represents the analysis of articles that are from digitalisaion (RQ 1, 22 articles), KM (RQ 2, 15 articles), and TT (RQ 3, 6 articles) categories.

4.1 RQ 1 thematic findings

Digitalisation improves economical activities by delivering value for various stakeholders. The ability to have rapid access to the questions, make a decision based on real-time data, and other examples allow organisations to explore opportunities of how to increase competitiveness. In terms of circular economy, the objectives are related to optimising resource usage by redesigning business as usual. Digital technology enables and improves various processes and business models that allow introducing competitive solutions that address CE objectives.

The impact on organisations of digitalisations is that it allows managers to improve or enable CE strategies and processes for internal purposes and/or for the supply chain (organisation network). Figure 7 shows that digital technologies contribute to the decision-making of an organisation. The organisation thus can choose whether to improve circular processes that are within (Internal) its organisation boundary or/and enable the opportunities of CE strategies for other organisations (External). By enabling the CE strategies further organisations in the circular supply chain can develop or adapt their circular processes to establish re-use, recycling, or other CE strategies.

With the increasing amount of supply chain shocks organisations are willing more to localise suppliers in order to have agility (respond fast in changing environment) by including digital technologies such as blockchain, sharing platfors, RFID‘s, cloud computing, etc. (Nandi et al., 2020).

Incorporation of CE related KPI’s, such as energy efficiency, resources and raw materials consumption, use of renwable and secondary resources, etc., can assist managers and other employees within organisation to develop circular solutions. This can be achieved by utlising cyber-physical systems (digital twins as such), sensors, IoT, etc. (Nara et al., 2021).

Rossi et al. (2020) suggest that the interconnection of data and information about the products enables automatization and decision making in regards to how reverse logistic should be organized, processes for maintainance, how raw materials use and energy consumption could be reduced, etc. The synergy of different organisations information within the supply chain allows traceability which can enable circular strategies as products and materials can be located, their condition can be know and the information of the products and materials can be accessed.

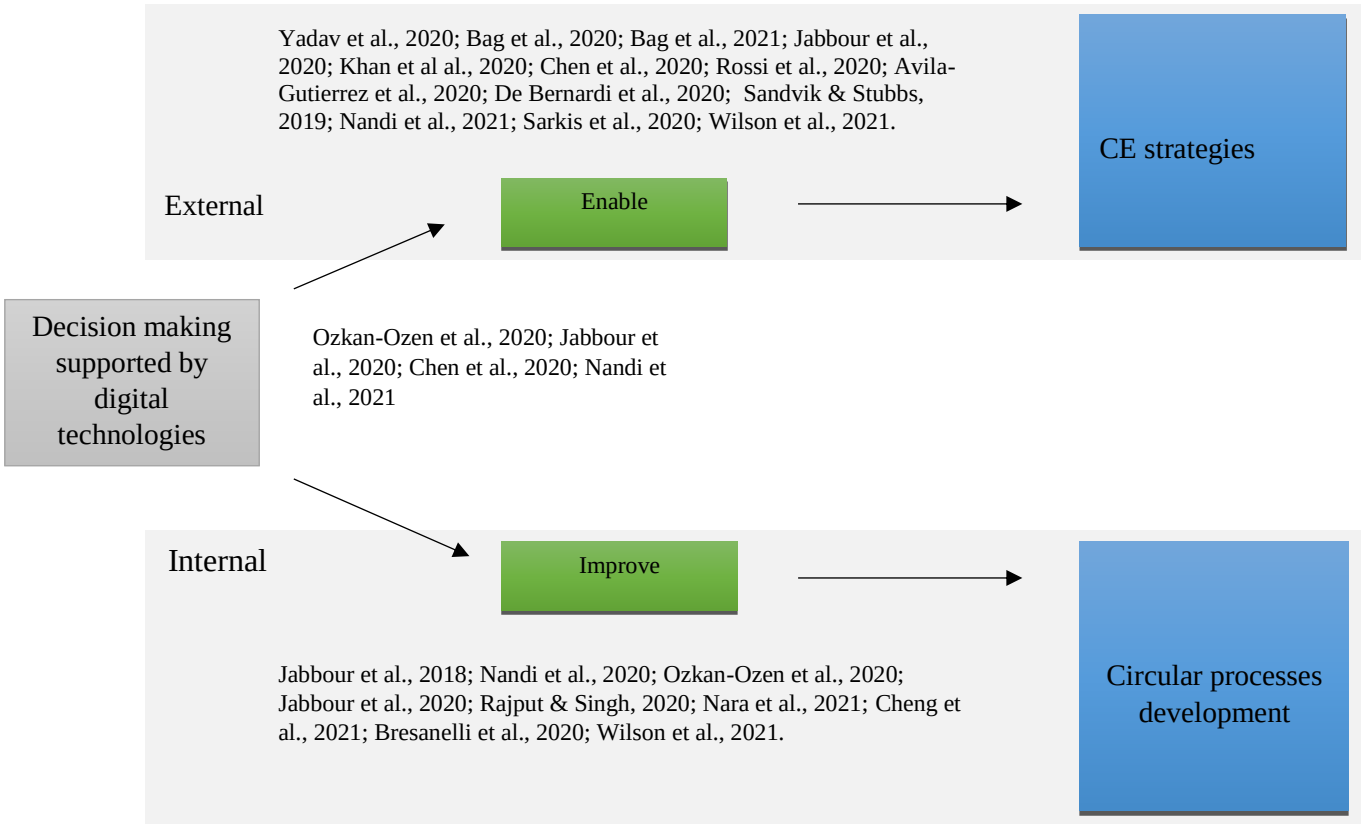

Figure 7. Conceptual framework of how digital technologies impacts organisation capabilities to develop circular processes
Source: made by authors

Digital technologies allow organisation to reduce materials consumption, decrease energy consumption, redesign products, and change business processes to tackle CE issues within its own organisations. The enabling condition for the circular supply chain existence is the organisations willingness to enable information access, co-operation, reverse logistics possibilities, etc. After that other organisations can follow up with their own circular processes, such as actions taken towards procurement or product design changes to reduce raw materials consumption, design out toxic materials, etc. This cascading effect can allow new circular business opportunities, ensure products and materials proper handling, re-use, recycling etc. along the supply chain. Digital technologies allow these processes to be more fluent and makes it possible to implement it with the help of digital technologies.

Figure 8 shows digital technologies which were analysed in the selected research articles. The most analysed technologies are IoT (10 articles), Big data (7), Cloud computing (6), and cyber-physical systems (5).

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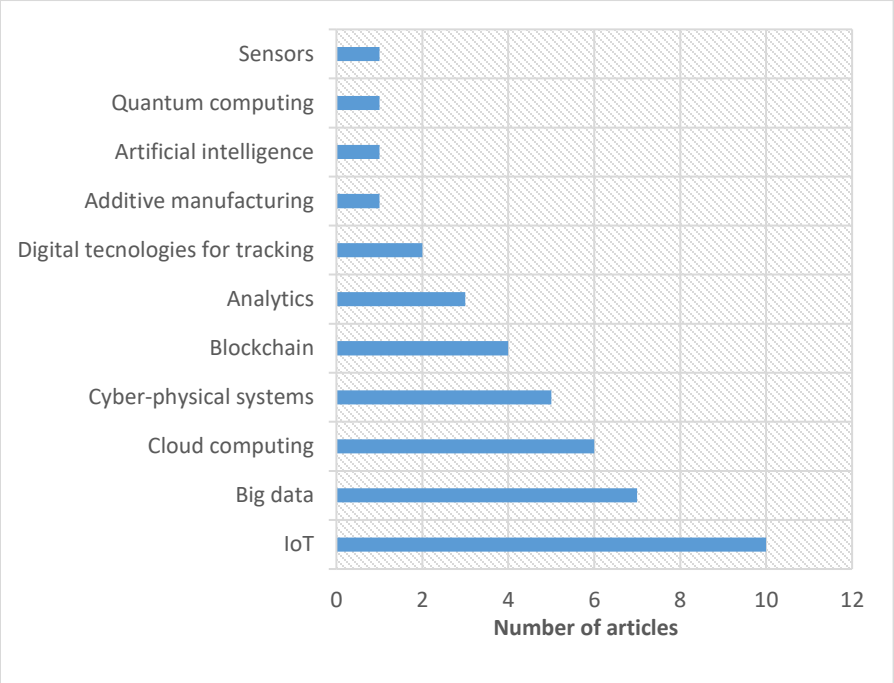

Figure 8. Digital technologies analysed in the reviewed articles
Source: made by authors

The reviewed research articles showcased what kind of impact digitalisation makes on the organisations capabilities to develop circular processes. Within the organisation, organisations are limited to redesign or develop new processes to address the circular economy through circular processes. Whether the process deals with reshaping the product design or decreasing resource consumption managers can make those decisions by utilising digital technologies.

The enabling conditions for implementing a circular supply chain, which means the supply chain ensures materials reutilisation, repair, etc., requires a significant amount of information sharing. It can be done through various ways that digital technologies support and enables, such as digital platforms, products tracking, etc. Managers of the organisations are capable to support the development of CE by the decisions they make to improve and/or enable conditions for circular processes development.

RQ 1: *What is the impact of digitalisation on the organisations capabilities to develop circular processes?*
Digitalisation allows better decision-making for organisations managers to develop and change business processes in a way that they would address CE objectives. Digitalisation is an enabler for achieving CE strategies by allowing organisations to work together to implement CE strategies at supply chain level.

4.2 RQ 2 Thematic findings

Knowledge management theory revolves around the central focus of the knowledge within organization. KM allows to attain, create and share knowledge for decision making purposes and for the creation of business strategies (Ferreira et al., 2020). It can contribute to new business structures and new concepts of management to improve the competitiveness of the firm. For the second research question of what is the impact of knowledge management on the organisations capabilities to develop circular processes 15 research articles will be reviewed.

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Figure 9 shows the main findings of the reviewed articles. Knowledge management's impact on organisations capabilities to develop circular processes can be separated into Internal (within organisation) and External (organisation networks). Organisations can improve the skills and competencies of the employees within the company for them to perform daily tasks by taking into consideration the CE context (Giudice et al., 2020; Belkadi et al., 2020; Ortega-Lapiedra et al., 2019).

By accessing the relevant knowledge within the organisation's network managers can develop and improve circular processes (Clulli et al., 2020; Kristoffersen et al., 2020). By identifying the relevant knowledge it allows to reveal opportunities for adapting or creating new processes within organisation to address the CE objectives (Wu et al., 2019).

The ecosystem of CE involves multiple stakeholders within organisations networks. Organisations can contribute to knowledge sharing for the purpose of making other parts of the supply chain more circular (Moreno et al., 2019). By understanding the relevant information that is attributed to specific products or materials new circular processes can be developed (Ruel et al., 2019).

It can be supported by ensuring knowledge accessibility for the relevant stakeholders in the supply chain (Moreno et al., 2019). The circular processes are linked with various circular economy strategies, such as reducing materials usage, enabling reparability, etc. Those CE strategies implementation requires multiple stakeholders co-operation as it involves complex processes of different organisations.

By synergizing the organisations knowledge, actively sharing knowledge, and participating in its formation it requires close co-operation of organisations and their networks (Brown et al., 2020; Cesur et al., 2020).

Trust is required within the ecosystem of managing CE strategies when multiple organisations and their networks are involved (Cantele et al., 2020; Melander & Pazirandeh, 2019).

Each of the organisation benefits from the active part of co-creation and sharing knowledge through their own circular solutions creation within organisations leading to reduced waste generation, increased materials and products recycling, etc. (Haziri et al., 2019; Razminiene & Tvaronavičienė, 2018).

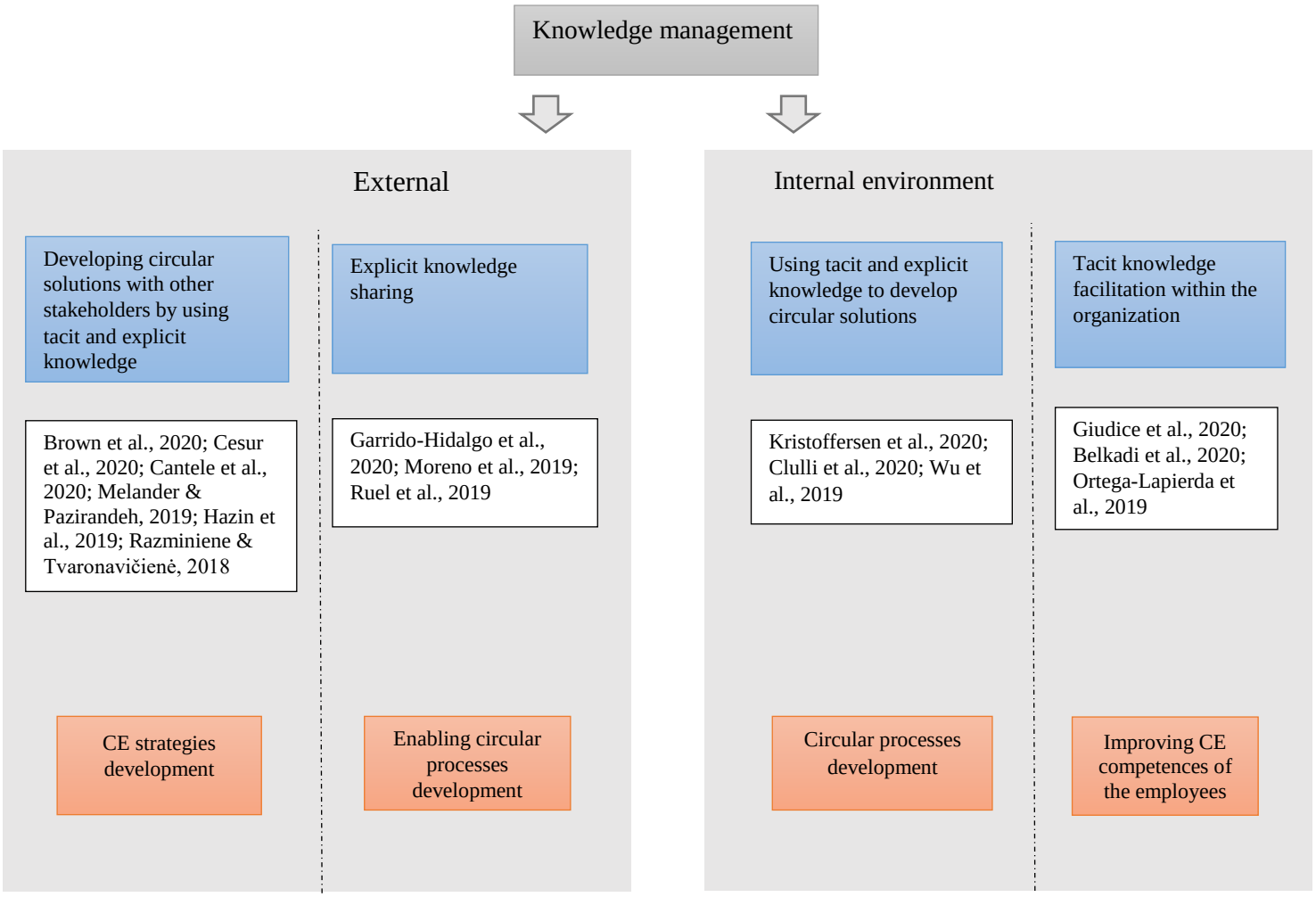

Figure 9. Conceptual framework of how knowledge management impacts organisation capabilities to develop circular processes.
Source: made by authors

Organisations capabilities are improved when they can facilitate tacit & explicit knowledge that is related to CE. By using the knowledge for their business processes and strategies organisations can develop their own circular solutions. To allow and foster CE implementation in other organisations there has to be knowledge sharing and co-operation of organisations and their networks. Within the CE ecosystem knowledge management of various organisations can lead to the creation of a circular supply chain through CE strategies implementation.

RQ 2: *What is the impact of knowledge management on the organisations capabilities to develop circular processes?*
Knowledge management contributes to organisations capability to develop circular processes by facilitating tacit knowledge within organisations. It allows organisation managers and employees to develop circular processes by utilizing explicit knowledge along the way. Each organisations explicit knowledge sharing enables other organisations to develop their own circular processes. When organisations work closely by using explicit and tacit knowledge they can implement CE strategies. The development and implementation of CE strategies require each organisation to contribute through their own circular processes development.

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3.3 RQ 3 Thematic findings

The modern world requires complex solutions to solve issues that block CE strategies. Technological solution's existence is only a step in an ecosystem where the right solution from an economic and environemntal perspective could be used to facilitate circularity. Technology transfer deals with explicit knowledge of the solutions created by one organisation that can be transferred to another organisation (Cho & Shenkoya, 2019).

The technology transfer impact on organisations capability to develop circular processes is shown in figure 10. Procedures, white papers, guidelines, physical assets, etc. can be transferred from one organisation to another. Either in academic spin-offs, focusing on specific technologies transferring (low carbon technology as such), or in other forms, organiastions can share explicit knowledge (Poponi et al., 2020; Kirchherr & Urban, 2018). The acquired specific or adaptable technology to organisation context allows the transferee to develop its own circular processes. To enable scalability and allow various other oragnisations to acquire relevant technology for CE development objectives the technology can be acquired through various methods, such as licensing, franchising, etc. It is referred to as conditional transfer where two parties agree on the technology transfer with specific rules. These transfers differ from one organisation to another through scalability, speed, the technologies are easier to locate through various platforms, etc. (Chen et al., 2020; Guo et al., 2020). Based on the open-source principle organisations can access freely relevant knowledge on how to repair products, footprints for 3D printing, materials passports, etc. (Unterfrauner et al., 2019; Gonzalez-Varona et al., 2020). The open-source principles of easy to access it and free-of-charge allow CE ecosystem stakeholders to use it for CE strategies and circular processes development.

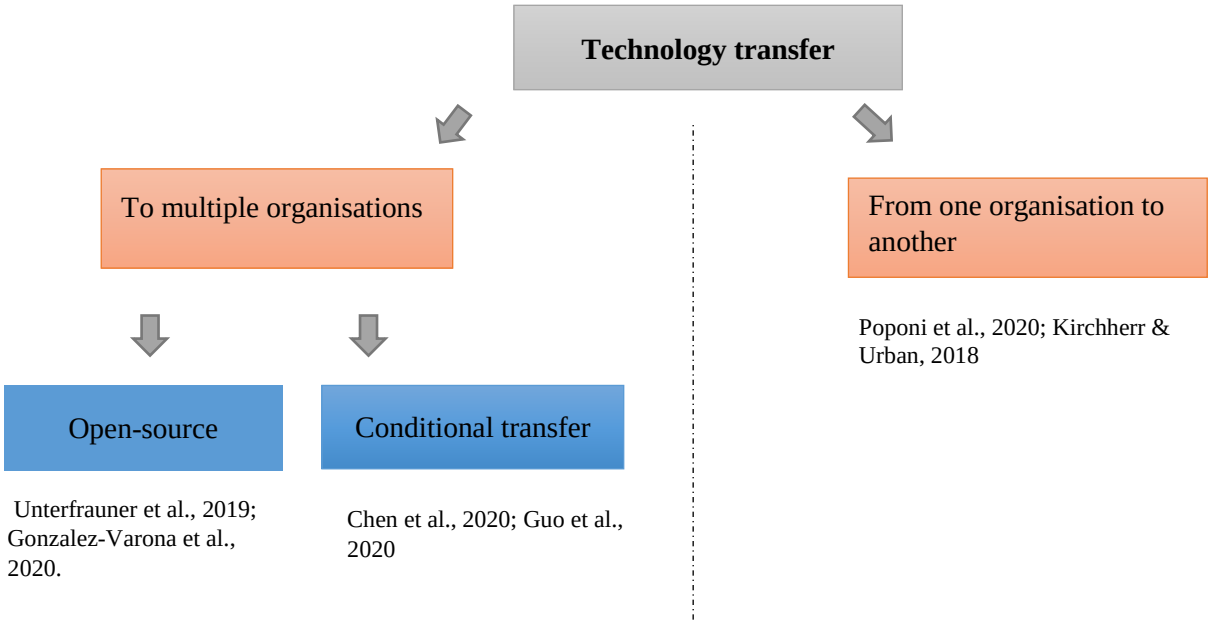

Figure 10. Conceptual framework of technology transfer impact on organisations capabilities to develop circular processes.
Source: made by authors

Technology transfer within the CE context allows relevant explicit knowledge diffusion among the organisations and their networks. It facilitates the capabilities of organisations to develop new circular processes within their organisations. By allowing the technology to be shared the CE ecosystem is enriched with the explicit knowledge to be used by various stakeholders which allows addressing the strategies of CE.

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RQ 3: *What is the impact of the technology transfer on the organisations capabilities to develop circular processes?* The transferer of explicit knowledge allows the transferee to use it for its own organisation circular processes development. Explicit knowledge can be shared with multiple organisations. Whether through open-source principles (open to everyone) or through specific conditions (licensing, franchise, joint-ventures, etc.) the explicit knowledge can be utilised on a larger scale to address CE objectives.

4.4 RQ4 conceptual framework

The impacts of digitalisation, knowledge management, and technology transfer support the capabilities of organisations to change business strategies or processes. The changes aimed at addressing the CE principles allow CE strategies to be achievable by various organisations networks.

Figure 11 provides findings from the reviewed articles on how digitalisation *facilitates* the knowledge management (implicit and explicit) of organisations, *improves decision making* on circular processes development, and *enables* CE strategies implementation. Databases, cyber-physical systems, IoT, etc. facilitate knowledge management within organisation and between them.

Real-time data, big data, data analytics, etc. improve decision-making for organisations capabilities to develop circular processes. It allows identifying what circular processes are needed, such as changing specific material of product design to make it more circular, developing guidelines for reparability based on the feedback from the downstream supply chain, and so on.

By accumulating and structuring the knowledge through digitalised solutions such as platforms, databases, etc. organisation networks can co-operate to align their business operations and processes for the implementation of CE strategies.

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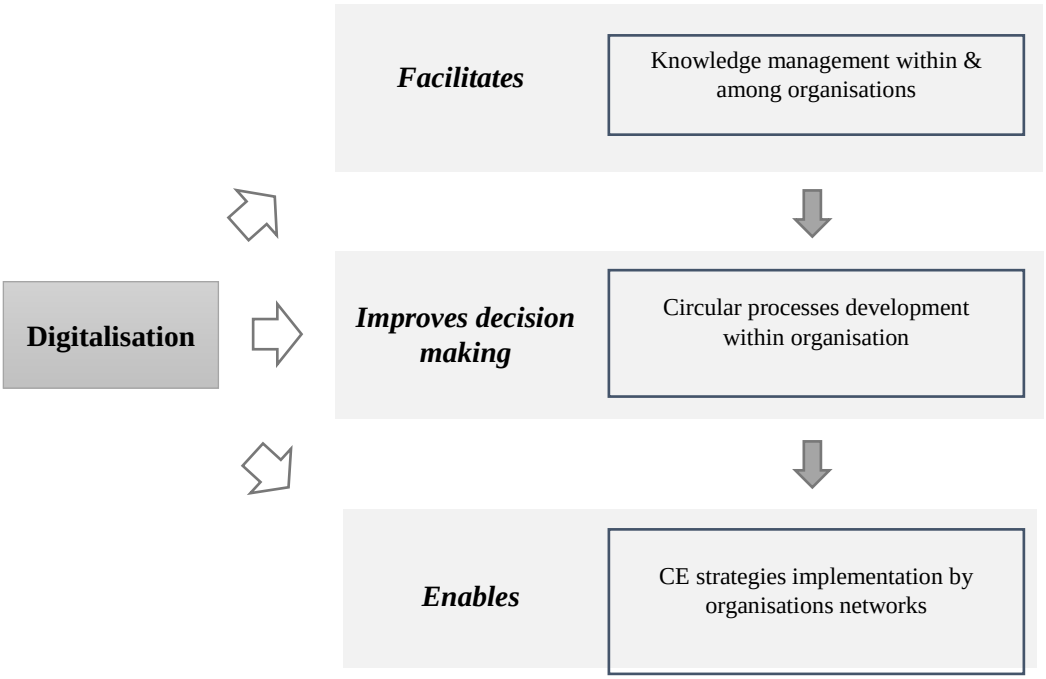

Figure 11.
Conceptual framework of digitalisation impact on facilitating, improving decision making and enabling knowledge management, circular processes development, and CE strategies implementation respectively
Source: made by authors

The proposed conceptual framework demonstrate the impact of digitalisation: facilitation, improved decision-making for organisations, and enabling CE strategies. Organisations and their networks, such as supply chains, clusters, etc. are able within the CE ecosystem to develop circular processes across each of the organisation to enable reparability, recyclability, and other CE strategies. The proposed framework depicts the most important functions of digitalisation in the CE ecosystem.

RQ 4: *How digitalisation can facilitate knowledge management and technology transfer for organisations capabilities to develop circular processes?*
Digitalisation *facilitates* knowledge in organisation and between organisations. It *improves decision-making* of organisation managers which allows them to perform better when developing circular processes. Digitalisation *enables* CE strategies by allowing multiple organisations networks to access relevant knowledge that is needed for them to implement specific CE strategies.

The findings of the reviewed articles demostrated the impact of digitalisation, knowledge management, and technology transfer on organisations capabilities to develop circular processes. The impacts are related to allowing better decision makings, required conditions that allow CE strategies, and how digitalisation facilitates the whole process.

Conclusions

Various digital technologies can improve organisations capabilities to access, store, share, analyse data, etc. Digital technologies improve organisation managers' capabilities to make decisions related to their organisation circular processes. It also allows other organisations to develop their own circular processes by making it easier to use relevant data and information. By working together organisations and their networks, such as supply chains, clusters, etc, can implement circular strategies.

Knowledge management allows the management of tacit and explicit knowledge. Within an orgniasation it allows improving employees CE related competencies, skills, etc., which combined with explicit knowledge allows circular processes development. Managing explicit knowledge among different organisations and their networks improves the capabilities of the networks organisations to develop circular processes within their own organizational boundaries. The combination of multiple organisations tacit and explicit knowledge enables CE strategies implementation for their networks.

Technology transfer, the transfer of explicit knowledge, allow organisations to transfer or receive required knowledge that can allow the establishment of circular processes. Technology transfering to multiple organisations through open-source principles or with specific conditions (licensing, franchising, etc.) scales the availability of CE-related technology and knowledge. These type of transfers allows various stakeholders to participate in the development of circular supply chain.

Digitalisation facilitates, improves decision making, and enables CE strategies implementation for organisations and their networks. Various digital solutions, such as big data, cloud computing, blockchain, etc., reduce the number of obstacles that prevent organisation networks to implement CE strategies. By improving organisations networks capabilities to develop circular processes digitalisation works as an enabler for organisation networks to align those circular processes (product design for circularity, allowing reparability, etc.) for implementing high-efficient recycling, re-use of products, and various other CE strategies.

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