Authors Title DOI Foivos Psarommatis and Gökan May Digital Product Passport: A Pathway to Circularity and Sustainability in Modern Manufacturing DOI	The article investigates the concept of digital product passports(DPPs) as an important tool for improving sustainability and transparency throughout the products lifecycle, from manufacturing to disposal, it identifies substantial gaps in existing literature covering the precise stages of	strengths and weakness and Highlight the gaps in knowledge within the existing literature regarding DPPs,	Methodology Literature Review: The research began with an extensive review of existing literature to identify gaps in knowledge regarding DPPs.	The study proposes a standardized framework for DPPs, addressing the current lack of clarity and uniformity in the literature. This framework is designed to enhance the	A DPP is not defined in a way that is generally agreed upon. Stakeholders become confused about its function Provides more understanding of DPPs Provides the understanding of challenges in implement	Yes Talks about DPP - needed for a understanding but not necessary
	product lifecycles as well as operational issues faced by DPPs, such as a lack of standardization data sensitivity, and the requirement for manufacturer incentives. The study proposes a structured methodology for DPP implementation that aims to promote a circular economy through improved product traceability and lifecycle management. key contributions and weaknesses from numerous research are summarized emphazing the critical need for a unifrom approach to DPPs. Moreover, the study emphasizes that overcoming practical hurdles through collaboration, technology developments, and legislative support is critical for realizing DPPS full potential in sustainable manufacturing practices.		DPP implementation was developed.	understanding and implementation of DPPs across various sectors. The research highlights several challenges in implementing DPPs, including: Lack of standardization across industries. Data sensitivity and availability concerns. The need to incentivize	and goal as a result of this ambiguity. The necessity of standardizing DPPs is emphasized in numerous research, yert there is a lack of guidance on how to do so. comprehensive adoption requires a standardized strategy. The significant barrier exists on the ways to encourage manufactures to supply the data required by DPPs.	
2 Rahel Kebede, Annika Moscati, Te Han, Peter Johansson A modular ontology modeling approach to developing digital product Passport https://doi.org/10.1016/j.spc.2024.05.00	This study explores the development of DPPs in construction industry. Used lit reviews and intervies as data collection methods. COnducted thematic analysis of data collected. Information need for DPPs include Product ownership status, Historical data, Stakeholder information and feedback, Usage and maintenance details Aligned with ISO/DIS 59004; BOT, BPO, Brick, REC, MAT, ENVO Suggestes to protect sensitive information while providing necessary transparency.	Conduct a comprehensive literature review to ascertain the key IRs that should be included in DPPs. Gather insights from industry experts through interviews to understand the perspectives on what information is essential for DPPs. Apply the MOMo methodology to create a modular ontology that enhance the reusability and interoperability of DPPs. Ensure that the developed ontology is adaptable for various use cases and aligned with existing standards and guidelines. Involve various stakeholders in the development process to ensure that the DPPs meet real-world needs and are likely to be adopted by the target audience.	Stakeholder interview MOMO methodology ess d	developed ontologies are aligned with ISO standards and guidelines from the European Commission. This is crucial for - Ensuring technical soundness - Enhancing practical relevance across diverse stakeholders involved in the built environment. The research highlights the importance of engaging with various stakeholders, including -Construction companies, Manufacturers, Policymakers, Consumers. This engagement is	ontology design pattern(ODPs) might not fully address the unique requirements of the circular economy. The effectiveness and usability of the created modular ontologies may limited by this restriction. one major obstacle is the complexity of choosing and implementing suitable ODPs. Technical challenges in integrating the ontology with current systems are one of the potential obstacles to the actual application of the modular ontology approach. opposition from	Yes Understanding of the methodok DPP architecture, information in to create an interoperable modu role based access control and d encryption something similar. to data security
3 Steffen Foldager Jensen, Jesper Hemdrup Kristensen et al Digital product passports for a circular economy: Data needs for product life cycle decision-making	that are pertinents to participants in the circular economy. The authors emphasize the significance of increased transparency and data sharing for efficient decision making by conducting semistrutured interviews with industry practitioners and validating findings using surveys. by highlighting the need for both statuic and dynamic data to enhance value retention and ebnable at	within a circular supply chain. Analyze how data needs differ across five distinct decision-making contex relevant to actors in a circular supply chain. Evaluate the perceived importance, availability, and sensitivity of identified data points to categorize them into critical, focused development, supportive, and out-of-scope data. Provide insights and guidance for practitioners to enhance their data	(Online) and Phase 2- Survey Sampling - Convenience Sampling: Selected actors based on the accessibility and relevance to the study. and Snowball Sampling: Utilized existing collaborations to encourage participation among	groups. Differentiated data needs for different actors. enhances tailored data management strategies for the requirements of different actors Assessment of data points based on importance, availability and sensitivity Explore the driving challenges that indeproduct passports Examine system re-	study does not cover the particular data requirements and issues that may exist in other sectors. The study does not fully examine how intellectual property rights affect data sharing, even while it recognizes the sensitivity of some data elements.	
4 Konstantinos Voulgaridis, Thomas Lagkas, Constantinos Marios Angelopoulos . Digital Product Passports as Enabler of the Circular Economy https://doi.org/10.1007/s11235-024-0110	techniques among participants in the circular economy.	Outcomes Exploring the Economic Impact of Circular Economy Models Identifying Barriers to Circular Economy Adoption Promoting Digitalization as a Driver for Circularity Implementing digital Product Passport		This study supports the idea that by improving data openness and enabling improved resources mangement, DPPs can make a substantial contribution to the digital circular economy. However, for DPPs to be implemented successfully, the stated management and technological problems must be addressed. in order to improve data gathering, selection, and sharing procedures, future research should concentrate on creating standardized frameworks and investigating creative approaches. The research sugg technical options to DPP framework. Examine the technical options to DPP framework.	The report recommends introducing digital product passports in phases, but it offers no comprehensive plans or frameworks for removing any gests investigating a number of that could be incorporated into the materail starting data. Problems with accessibility to raw materail starting data. Problems with geolocation when installing IoT devices. Possible restriction on the volume and precision of the data. The completion of the datadriven	Yes The framework offers an organimethod for evaluating and apply DPPs in practical settings.
					administration. Ensuring data security and integrity presents challenges, especially with regard to IP addresses and possible	
5 Lopes, Carla, Barata, João Digital Product Passport: A review and research agenda	The paper examines the new idea of DPPs, which are essential for promoting circular economy projects and improving supply chain sustainability, it emphasizes that DPPs are special digital documents that contain and reveal important information on the sustainability of products over the course of their existence. Although DPPs potential, the authors claim that the study on it is still in its infancy and is fragmented, offering many prospects for investigation, especially in the area of sustainable supply chain management. The authors mapped the existing research environment, identified essential structural features, enabling technologies, and problems related to DPP implementation by conducting a thorough literature review and bibliometric analysis of 40 publications made since 2021. To address data governance and improve the usefulness of DPPs they stress the significance of stakeholder participation and the integration of mulitiple disciplines, including law and digital transformation. Accoprding to the results, even though there has been a lot of improvement, more study is required to close any gaps and improve the usefulness of DPPs across a range of industries. The distribution of product categories and reserch methodologies is illustrated in Figure 1, which emphasizes how conceptual in nature a significant amount of the literature is. The Figure 2 focus on the lists of the top DPP research nations, with Germany being the most active. The Figure 3 describes the digital twin and block chain are two technology trends that are essential to DPP implementation, as illustrated by the keyword analysis. Moreover, Product information, environmental data, production details, and utilization information are among the common structural components of DPPs that are complied in Table 1. The difficulties with DPPs are liste in Table 2, which addresses data, commercial, compliance and regulatory concerns.	analysis of literatures to gauge the growth to establish a conceptual framework detailing the structure and essential components of DPP Explore how various stakeholders can contribute to and benefit from DP Assess the requirements for data collection, processing, and sharing to support effective DPP functionality Highlight the challenges faced by companies in adopting DPPs (regulatory technical and operational difficulties) Analyze how DPPs can contribute to sustainable production and consumption practices, aligning with the Sustainable Development Goals (SDGs).	Bibliometric analysis and concept-centric approach (4 approaches) colaboration and reflection Ps.	technologies, and the related requirements and obstackes by analyzing 40 chosen articles. Accordsing to the research DPPs have the potential to drastically alter supply chain information flows, promoting greater sustainability and openness. Nevertheless, a number of drawbacks were noted, most notably the emphasis on the DPP artifact rather than exploring the intricacies of stakeholder interactions across the product lifetime. The study emphasizes the need for additionalinvestigation into real world aplications especially when Investigate the states and obstackes by each step of the supplies to the research DPPs have the potential to drastically alter supply chain information research and police re	The analysis used only two databases, such as web of science(WOS) and Scopus; aithough they are prominent, they might not contain all relevant points. The study reveals insufficient attention to data governance issues such as privacy, security, and trust in data sharing. These are crucial for DPP andardization of DPPs and their analysis used only two databases, such as web of science(WOS) and Scopus; aithough they are prominent, they might not contain all relevant points. The study reveals insufficient attention to data governance issues such as privacy, security, and trust in data sharing. These are crucial for DPP implementation but are not fully addressed, leaving a gap in understanding how to properly manage these problems. The complexity and variety of stakeholder interactions across	No This study is relevant by provide examples of how DPPs can fact sustainable practices in various
6 Mihai Hulea, Radu Miron and Vlad Muresan Digital Product Passport Implementation Based on Multi-Blockchain Approach with Decentralized Identifier Provider	The research focuses on implementing and evaluating a DPP system using blockchain technolog in hyper ledger fabric network (textile industry). they tested the effectiveness of ths system in handling multiple requests and CRUD operations (Create, Read, Update and Delete). In their solution, they have combined DID - Data Block Chain and DPP-DB for better data security and data management, DID-DB contributes to data security whereas DPP-DB contributes to data management. How it works: create a DPP for a new product which includes a DPP document and DID document, creates a DID identifier for the product to look up and interact with the DPP document. The block diagram for the proposed solution includes a user application which has both DID controller and DPP controller. theyworks paralally, when the user application scans the QR code (DID identifier) from the physical product, DID contorller handles the creation/resolution of DPP document and metadata, whereas the DPP controller helps to read or write the DPP document (Maybe the CRUD operation)	Evalauate the perfromance of the proposed solution.	1, Proposing the Data architecture 2. Data model design 3. Implementation of chaim code 4, Performance testing	Evaltuated the solution with a test network and fouund the basic operations remain unaffected processing rate. Consensus Overh resources needed expands. Storage Requirem needs for maintain Network Latency in larger networks	while testing they focused on CRUD operations with 100 requests at a time. There can be scaöability issues when practically. Block chain technology has the ability to improve data integrity - crutial for protecting data from unauthorised alterations Block chain technology has the ability to improve data integrity - crutial for protecting data from unauthorised alterations The study highlists the need of strong collaboration among the different organizations involved. The study highlists the need of strong collaboration among the different organizations involved. The study highlists the need of strong collaboration among the different organizations involved. The study highlists the need of strong collaboration among the different organizations involved. The study highlists the need of strong collaboration among the different organizations involved.	a d es
7 Rhoda Gasue, Samuel Aklashie, Annabel Morkporkpor and Kofi Agyekum Implementing material passports in the construction industry: Empirical evidence from Ghana	the poposed solution was analysed for its performance. The deployed a fabric test network which has 3 organizations namely, survice provider, manufacturer and supplier. They calckutace the average responce time for primary operations. This study investigates the awareness and implementation of materials passports(MPs) in the Ghanaian construction industry, focusing on the awareness, challenges, and strategies for effective implementation. Utilizing a quantitative research method through a structured questioniare was distributed to contruction professionals, including managers, architects, engineers, and quantity surveyors, yilelding a response rate of more than 70 percent. This data declare vital insights into the presentate of knowledge and practices respecting MPs in this construction industry. Key challenges detected include a lack of awareness and knowledge among professionals, soci cultural barriers, and the complexities related with adapting and utilizing MP system. Statical analyses such as one sample T tests and One way ANOVA, displayed vital differences in awareness levels based on professional qualification and years of experience, suggesting that highly experienced and educated professionals are more likely to be aware of MP concepts. To facilitate the successful integration of MP systems, they proposes targeted educational programs, stakeholder engagement, and the updation of standardised protocols.	The main objectives of this study, which examine the implementation of Material Passports(MPs) within the Ghanaian construction industry. Evaluate the Awareness levels of construction professionals regarding the concept of Material Passports. Assess how widely Ghanaian construction professionals are currently employing material passports(MPs).		currently low among the Ghanaian's construction professionals, there is astrong willingness to adopt these principles. By addressing the highlighted difficulties and applying the recommended measures, MPs may contribute to Ghana's more sustainable building industry. this study not only adds to the current body of knowledge on MPs and circular economy concepts, but it also provides the groungwork for future 2. Effect of educa 3. Models for coll 4. Integration of Modelling. 5. Comparative st 6. Technological a 7. Strategies for or	or verifying and reliable Data. The study used a quantitative research approach, which may limit the depth of discoveries. MPs with Building Information studies in various regions. advancements in MPs. overcoming adoption barriers. ork development. The study used a quantitative research approach, which may limit the depth of discoveries. Respondents were unable to convey detailed thoughts or experiences regarding MPs. The report recognizes issues in the creation and execution of MPs but does not propose specific solutions or frameworks to solve these challenges. Provides valuble insights that are relevcant to the development and implementation of digital product passports, particularly concerning data integrity, stakeholder collaboration, and educational needs. By leveraging ontology based cybersecurity, stakeholders can ensure that both Material passports(MPs) and Digital Product Passports(DPPs are secure, reliable, and effective in promoting sustainability and circular economy practices.	No Good but different tem. Can be considered as a casestudy for D Nothinf related to cybersecurity mentioned
8 Suthan Renuka, Chirathalli Gumanna Guruprakash Reliable ontology based access control mechanism for improved security in health care data	The study porposes an enhanced mechanism for data secuiry and access control in the health care sector using a medical ontology based access control (OBDA) protocol. They proposed a 3-tier security model to manage access; User job scheduling (Manages the	Examine how knowlkedge and implementation levels of materials passporare influenced by demographics factors like experience level and professional qualifications. proposed OBDA, develop access control strategy to enhance data secur Improving access control mechanisms Evaluation of perfromance metrics		The new approach as high accuracy rate ~ 96.33%, Throghput 0,88mbps during encryption, overall 369. 35mbps Very low information loss and delay t modifications to a modification to a modifica	study as teh IoMT advances and accomodate that changes and accomodate that changes and accomodate that changes are descriptographic methods to reduce the completely formalized The study mentions the current cyprtographic technologies will result in longer encryting and decoding times. This could affect the response time The authors mention the ontology is not completely formalized The authors mention the ontology is not completely formalized By considering the key differences (Maybe industry of data types etc.) well enough, this paper can guide the current research	the model
9 Nao Takisaki, Yoshiyuki Kido, Yoshiyuki Masuda, Yoshihisa Toshima, Matsuki Yamamoto, Shinji Shimojo Ontology-Based Access Control Framework for Smart Buikling IoT Devices	The study proposes a framework for ontology-based access control for smart building IoT devices. Ontologies used - BRICK and ORG The proposed framework contains, Ontology based models, RDF Converter, WoT Manager and RBAC Manager as its componets How It works: 2 main system control this framework, WoT system and RBAC system. WoT manager automates the construction if WoT system. It uses SAPRQL Query on the building model to dather necessary information about devices. It compiles the data in to a JSON file. WoT manager selects a suitable template file based on the device types and inserts gathered information in to these template to create necessary codeing for each device. Finally they deploy constructed things in to the system environment. RBAC system manages user permissions and roles efficiently. The RBAC manager automates the association of roles to users, based on the organization model. The system doesn't assign permissions individually but they uses predefined permission sets. it has hierarchical roles allowing permissions to be inherited by sub roles. RBAC system uses SPARQL querying to gather information about organizational structures and device types.	Implementation of WoT Manager To implement RBAC Evaluation of the proposed framework	Design the framework Automation of different components Developing the prototype Evaluation of the prototype	They demonstrated the framework designed for smartbuildings. Explained the effectiveness of framework in automating the WoT systems They have quantified the reduction in manual work/coding They emphasise their framework is scalable to adapt more practical conditions.	research didn't acccomodate diverse environments There is no details of how they automation happens and how they did it. No discussion about user technical knowledge requirements for this framework. It doesnot discuss about the security issues araise when automating the processes Does not mention the framework's ability to integrate with exisiting technologies.	
10 Fatemeh Abedi, Ulla A. Saari, Liisa Implementation and Adoption of Digital Product Passports: A Systematic Literature Review	The journal focusing on the implementation and adoption of Digital Product Passports(DPPs) and Material Passports(MPs) across various industries. The analysis used ATLAS.ti software for the contraction of the contraction o	Article selection and enhancement.	Database Search Optimization and selection	Passports(DPPs) and Material passports(MPs) has yielded the currently studied	Lack details about how the RBAC system works, Did they use any This study only used the scopus database, which may not include all facilitators and challenges to dpp implementation, but	No Relevant, but have so many oth reserches to understand DPP
	thematic coding to find first order topics relevant to DPP uptake and implementation, which were then classified as second order themes using the Technology Organisation Environment(TOE) framework. The data show that the textile and construction industries are leading the way in DPP adoption, with MPs mainly used in the construction and waste management sectors. Digital technology improvements, excellent data management, and the adoption of specific regulations are all key enablers fro DPP implementation. This study also underlines the importance of improving technology caapabilities, encouraging stakeholder collaboration, standardized data formats for better interoperobility and data security and building confidence in the supply chain for successful DPP implementation.	Determining the barriers and enablers. Implementation of the framework for Technology, Organization, and Environment(TOE). Suggestions for stakeholders. Directions for the future research. Contribution to the sustainable development goals.	3. Detailed analysis4. Using the framework5. Limitations	various industries. The study underscores the critical role of DPPs in advancing sustainability and circular economy practices, while also highlighting the need for collaborative efforts to overcome existing challenges. The findings indicate that the successful implementation of DPPs bypers. The findings indicate that the successful implementation of DPPs bypers. The findings indicate that the successful implementation of DPPs bypers. Assess how techniques.	velopnent of standardized data formats ensure interoperobility among different management as a challenging part, however it does not go into specific methods or frameworks to address these issues. Future study could look into more passport kinds and address authentication issues to improve the reliability of data provided among stakeholders.	
Christopher Brewster, Barry Nouwt, Stephan Raaijmakers, Jack Verhoosel Ontology-based Access contro for FAIR data https://doi.org/10.1162/dint a 00029	This study aim to propose ontology based access policies to get secure access to FAIR data, more specifically, they focus on teh accessible part of FAIR data. Their model integrates 1) FAIR aspect of the data - Provenance and liscence, 2) User metadata for personalized access control. The study applies to sensitible information in law enforcement domain and health domain OBAC depends on a graph-based representation of metadata following Linked Data or knowledge graph principles. Once raw data become linked to metadata graphs, structure-sensitive access protocols can effectively regulate views on the underlying raw data through traversal of the metadata graph.		web market place exracted 500 records from the listing	Address A1,2 (Accessibility) and R1,1 (Data usage and liscence) Demonstrated implementation through proof of concept Explained the integration of the proposed model with existing technologies	Selection of data types - broder datatypes accomodate dataanalysis for deeper understanding of trends and patterns Used only first few records form a large dataset - reduces eh generalizability of the study Did only static analysis, no scope of accomodating the potential dynamics in the chosen domain The study says they assigned roles for datatypes accomodated dataanalysis for deeper understanding of trends and patterns A fair method that can be considered.	
12 Manuel Paneque, Maria del MAr Roldan Garcia, Carlos Blanco, Alejandro Mate, DAvis G Rosado, Juam Trujillo 13 Sabrina Kirrane, Alessandra Mileo, Access control and the resourse Description 14 Manuel Paneque, Maria del MAr Roldan Garcia, Carlos Blanco, Alejandro Mate, DAvis G Rosado, Juam Trujillo AN Ontology based secure design framewrok for graph- based databases AN Ontology based secure design framewrok for graph- based databases AN Ontology based secure design framewrok for graph- based databases AN Ontology based secure design framewrok for graph- based databases AN Ontology based secure design framewrok for graph- based databases AN Ontology based secure design framewrok for graph- based databases AN Ontology based secure design framewrok for graph- based databases AN Ontology based secure design framewrok for graph- based databases	This study developed an OWL2 ontology They study focues on graph-based databases. The model integrates an otological layer Thet allows for the implementation of ontology rules. ensured integration with TITAN framework and then created OWL2 ontology they included provision for model transformations - helps to convert design specifications in to executable implementations. (makde as python scripts packaged in a container- easier to deploy for the evaluation - use case study - chose healthcase to manage sensitive patient data, they demonstarted how the framework could be applied to design a secure graph based database. They also tested the framework in different technologies, showcasing their versatality. They have implemented something to check the consistency and correctness of the security rules. They took feedback from the healthcare case study, for further refinement of the framework, the framework ensure compliance with FAIR principles Discussed the critical aspects of data security, explains various concepts, approaches and	To conduct a casestudy to showcase the ability of the proposed framework to find error in teh framewor built Analyze different access control models	different roles Literarure review and background study Ontology developement framework designing TITAN framework integration Fremework application in a real case (Casestudy) rk Error detection	Automatic derivation of security immplementation based on teh underlying technology - saves time and reduce errors ensures applicability in domains requiring high security for sensitive data (e.g. healthcare) The authors emphasic on the scalability also. This paper adds to our understanding of access control in rdf by Graph based data	their firt priority, which makes security somewhere down the list so no standardized security mechanism implemented, were an say Evaluation method can be adopted from the paper. This study highlights the lack of a specified the applicable areas other than graph-based databases. Evaluation method can be adopted from the paper.	en't access managemnet of this sens requires fine grained security co
Stefan Decker Framework: A survey 14 Rahel Kebede, Annika Moscati, He CIRCULAR ECONOMY IN THE BUILT	challenges Investigated different access control models and standards suitable for Linked Data web. Different Access control models: Discretionary Access control (DAC)- to control access to own resourses; Mandatory Access COntrol (MAC) - access is determined by any central authority based on multiple levels of security; Role-Based Access Control (RBAC): Permission are assigned based on roles rather than individual users. policy languages - XACML (for defining access control policies), OWL (for creating ontologies that can express complex access control rules)	Propose guidelines for explanatiosna and negotiations - to helo the request understand requirements evaluated effectiveness of Access control tried to extend exisiting framework for authorization. Proposed safe reasoning strategies that prevent unauthorized information Also proposed query rewriting strategies Identify key components of the framework.	2. Data Collection 3. Proposed Techniques 4. Perfromance Evaluation 5. Implementation requirements 6. Reasoning Strategies 7. Evaluation Metrics 8. Future work 1. Research question.	presenting a comprehensive framework for conflict resolution and policy enforcement. The findings emphasize the importance of adaptive context aware access control techniques that can effectively manage the complexities of modern data environments. By addressing these issues, the proposed techniques hope to improve both the security and usability of access control systems in dynamic environments. Investigate reason interference from sensitive information. Investigate the role such as requester elements. Create accesscon experience while interference while interference for a create sophicated.	defined access control baseline for comparing various approaches to policy enforcement and management. this gap make it difficult to assess the efficiency of various models and techniques. Conflicts between policies are not adequately resolved, which might lead to unclear access control circumstances. The development of determining technologies can complicate administrative tasks. administrators may struggle to handle complex policies, particularly when working with enormous datasets. defined access control baseline for comparing various approaches to policy enforcement and management. this gap make it difficult to assess the efficiency of various models and techniques explained in the study may araise in the current research The use of open standards (RDF, OWL, SPARQL) can be benefited to current study ability of Dynamic Access control Policies explained can be reused in the research Policies explained can be reused in the research This study explains different models and languages for access control, Use of semantic technologies, emphas on interoperability The challenges explained in the study may araise in the current research The use of open standards (RDF, OWL, SPARQL) ability of Dynamic Access control Policies explained can be reused in the research The study highlights the value of combining various datasets.	predicting methods and access in the context of the resource description framework(RDF) a semantic web. This study is relevant as it offers
Tan, and Peter Johansson ENVIRONMENT: A FRAMEWORK FOR IMPLEMENTING DIGITAL PRODUCT PASSPORTS WITH KNOWLEDGE GRAPHS	new framework that combines major elements discovered in existing research. These themes include the importance of data collecting throughout the products lifecycle adherence to standards and rules, effective data modelling and strong data governance procedures. The findings highlight the necessity of using knowledge graphs(KGs) to integrate data from several sources allowing stakeholder to make educated decisions about product reuse, recycling or remanufacturing. A conceptual framework is proposed to demonstrate how KGs can model and integrate data gathered from various actors in thre built environment. This approach highlights the importance of ongoing maintenance and upgrading of DPPs to preserve their relevance and correctness. It also emphasizes the function of KGs in facilitating compliance with rules and standards, hence increasing the overall effectiveness of DPPs in promoting sustainable practices in the construction industry.		 2. Literature review process - Systematic search, search strategy paper selection process. 3. Inclusion criteria & exclusion criteria. 4. Data synthesis approach. 5. Findings and framework development 	graphs(KGs). After conducting a thorough literature study, they identified crucial components for this framework, such as use case identification, data collection, modeling, integration, goverance, access and querying, as well as maintenance and updating. their findings underscore the significance of these elements in aiding while displaying de Establish thorough adherence to glob limprove the particular findings underscore the significance of these elements in aiding and all playing de Establish thorough adherence to glob limprove the particular findings underscore the significance of these elements in aiding access and querying as well as maintenance and updating.	Challenges in data colection. Compliance and regulatory issues. Technological integration: The report does not fully address the technical difficulties involved in putting such systems into place, even though KGs are suggested a as way to integrate various data sources. Challenges in data colection. Compliance and regulatory issues. Technological integration: The report does not fully address the technical difficulties involved in putting such systems into place, even though KGs are suggested a as way to integrate various data sources.	utilizing KGs in addition to addr

	Stop Guessing in the Dark: Identified Requirements for Digital Product Passport Systems https://doi.org/10.3390/systems11030123	This study examines the needs for digital product passports(DPPs) systems using a literature review and nine semi-structured experts interviews. The specialists, largely from industry, were chosen based on their technical credentials and contributions to the sector. the interviews tried investigate the underlying technical infrastructure required for effective DPP systems, which are	facilitates tracking and managing product lifecycle data.	interviews. Uses ISO/IEC 25010:2011 as a framework for requirement	Identifies core requirements for DPP systems, including data security, modularity, accessibility, and legal compliance. Highlights gaps in energy/resource consumption and data	Investigate energy and resource consumption in DPP systems. Develop a framework for evaluating DPP system	environmental footprints of the DPP systems. interoperability challenges highlighted in the study.	The study is well-structured, addresses a significant gap in digital infrastructure for circular economy initiatives, and aligns with industry needs.
		critical for achieving circular economy goals by improving transparency and information exchant throughout product lifecycles. The study identifies gaps in the existing literature about DPP system energy and resource utilization, as well as data privacy problems, especially when personal data is included. furthermore, it argues that the concept of data spaces could serve as a basic framework for DP systems, emphasising the nedd for further study to improve these needs nd investigate their actu implementation. An overview of the needs for DPP systems that have been identified and grouped under legal	P P	classification.	Privacy. Calls for further industry collaboration and standardization efforts. □	compliance with regulations. Enhance data privacy and IP protection mechanisms in DPPs. Explore the use of data spaces as the backbone for DPP systems.	Limited focus on the data privacy beyond security concerns. Need for standardized approach to interoperability in DPPs.	
16 Pedro Mêda, Hipólito Sousa, Eilif Hjelseth	Data Templates—Product Information Management Across Project Life-Cycle	duties, functional suitability, security, and other important variables is given in the Table 1 of the The paper includes a complete literature analysis as well as a case study focusing on the importance and effects of streamlined information management in the construction industry, specifically the usage of data templates. it underlines the importance of these templates for the digitalization plan and how they contribute to the industrys sustainability and circular economy. The article addresses a variety of stakeholders, including owners, designers, contractors, and manufacturers, and highlights the issues they encounter in efficiently adopting data templates. the study finds that, while digitalization, notably through building information modelling (BIM), is critical for modernizing building techniques, considerable barriers to ensuring seamless information flow across the construction lifecycle remain. Key findings show that structured data is required for efficient information management, and the study includes key figures includes figures 1, which depicts the essential components and their	To analyze how data templates can enhance digitalization. Streamline construction information management. Support sustainability and circular economy goals.	Literature review and case study methodology. The case study focuses on the role of data templates in structuring product information and improving lifecycle data flow.	Highlights the importance of standardized data templates in improving construction product information management. Emphasizes that structured data enhances sustainability, digitalization, and interoperability across stakeholders.	Investigate the role of digital solutions in managing data templates effectively. Develop tools for integrating data templates with BIM and digital construction workflows. Study the regulatory implications of data standardization in construction.	templates effectively. relevant to teh research	This paper may be relevant as it provide digital solutions in managing data templates effectively
17 Mark D. Wilkinson et al.	The FAIR Guiding Principles for Scientific Data Management and Stewardship https://doi.org/10.1038/sdata.2016.18	interconnections for achieving a modern construction vision supported by BIM and integrated design and delivery solutions(IDDS). Figure 4 also shows a matrix that specifies information required during the construction process, taking into account the various stakeholders responsibilities and viewpoints. The study highlights how urgently the infrastructure supporting the reuse of scholarly data has to be improved, it finds that the main obstacle to efficient data management is not a lack of technology but rather the negligence with which digital things are created and preserved, a worked called jointly designing a Data Fairport, which took place in leiden, nerrherlands in 2014, brought together funding agencies, industry, and academic parties to discuss issues with data discovery and reuse. The FAIR guiding principles were developed as a result of this collaboration and support the creation of research objects that are findable, accessible, interoperable, and reuasble. The study emphasizes the value of data management and leadership, claiming that effective approaches in these domains promote innovation and knowledge discovery, it also talks about	To establish a clear set of principles that guide researchers, data producers and repositories in making scientific data more accessible and reusable, benefiting both human and machine users.	, Conceptual framework and literature review, based on a workshop held in 2014. It outlines key principles and provides examples of FAIR-compliant initiatives (Dataverse, FAIRDOM, UniProt, etc.).	The FAIR Principles ensure better data stewardship, leading to improved discovery, reproducibility, and integration of scientificata. They emphasize machine-actionability, structured metadata, and persistent identifiers.	principles. Improve interoperability of datasets across disciplines	Lack of standardized tools for FAIR implementation. Challenges in making legacy datasets FAIR-compliant. Need for policies that enforce FAIR data practices. Aligns with ongoing research in open science, semantic web, and digital data governance. research on ontology-based access control in DPPs relates to FAIR principles, particularly in interoperability and controlled accessibility of digital product data.	Highly influential paper - providing clea guidelines for making scientific data more reusable and accessible.
18 Cogan Shimizu , Pascal Hitzler	Accelerating knowledge graph and ontology engineering with large language models	how different types of data repostoruies both general purpose and specialized have emerged are the paper investuigates how Large Langauge Models(LLMs) can be incorporated into the creation of knowledge graphs and ontologies(KGOE), emphasizing how they can improve diificyult tasks like population, alignment, and ontology construction, early achievemebnts have been noted in smaller tasks like schema creatuon and subject ectraction, despite the difficulties with LLMs, including as agrumentation and dependability concerns. Large LAnguage Models(LLMs) are examined in relation to the creation of knowledge graphs and ontologies(KGOE), emphazing how they can improve ontology construction, alignment, an population, among other challenging tasks, simpler tasks like topic extraction and schema generation have shown early success despitebthe difficultities with LLMs, including argumentatic dependability problems, the authors suggest using structured splitting of ontologies or conceptual modules to enhance LLM perfromance inKGOE tasks. As conceptual links between human comprehensive and machine interoperability, these modules show that modularity is necessary for efficient KGOE.	Enhance KGOE Tasks with LLms Modular Approach to ontology Design Benchmark Development Semantic Web Standards modifications Comparative studies on modularity Address limitations of LLms Broader implications for ontolgy and knowledge graph paradigms	Conceptual framework Identification of tasks methdological approach Evaluation metrics challenges and limitations Future directions	The paper demonstrates how Large Language Models can improve knowledge graph and ontology engineering tasks.it highlights that although LLms demonstarte impressive abilities producing structured data and retrieving a great amount of human knowledge their dependability in delivering precise material is still a problem. However LLms can drastically cut down on the timne and effort needed for intricate KGOE activities when combined with domain experts. Large Language Models have the potential to improve knowledge graph and ontology engineering tasks according to the study. it highlights that although LLMs are remarkable goo at creating organized material and remembering a great deal of human knowkedge using them consistently to produce accurate content is still difficult. However the time and effort needed for complicated KGOE activities can be greatly decreased when LLMs are teamed with domain experts. in order to improve results in activities like ontology modeling, alignmentt, and extension the study argues for the imcorporation of modularity in ontology design. it manage this by dividing large modules, which improves the efficiency of LLms in processing and producing pertinent information.	To make KGOE work easier, look into modifying currenbt semantic web standards(OWL and RDF). Investigate KGOE task simplification by modifying we established semantic web approaches. Examine the ways in which LLms can incorporate different module definitions outside of the current conceptual frameworks. Recognize the possibilities and limitations of LLMs based, non modular KGOE. Analyze how well established ontology and knowledg graph frameworks can benefit from modularity.	The study mostly concentrates on one kind of conceptual module, which might not cover all potential modular strategies in knowledge graphs and ontology research. the findings may not be as broadly applicable to other modular systems due to this restricted focus. There is a chance that the emphasis on modularity will divert attention from investigating alternative cutting edge approaches that could improve KGOE tasks as well resulting in a rather constrained research agenda. The study underlines how crucial the provided context is to effective entity disambiguation, the authors contend that results in KGOE assignments can be considerably improved by enhanced contextual understanding achieved through complicated ontology alignment. The study advocates the investigation of how modularity might enhance well established ontology and knowledge graph paradigms as well as systematic comparison investigation on the beneficial effects of modularity in diverseKGOE tasks. The necessity of conducting empriical research to confirm the advantages of modularity in LLm driven KGOE problems is emphasized. According to the authors LLMs have the ability to improve and automate KGOE activities, especially when paired with a modular strategy, they propose that LLMs can be used as instruments that arae semiautomatic and less demanding on human specialists.	
	LLM-Based Guided Generation of Ontology Term Definitions	The study presents a strategy for using large language models(LLms) to produce definitions and descriptions for ontology concepts, addressing the growing requirement for accuratye representations in domain specific knowledge graphs. the authors emphasize the labor intensive nature of generating accurate term definitions, which frequently resulkts in errors and contradictions due to subjective readings of literature. the suggested strategy intends to streamlifthis procedure by using LLMs, resulting in significant time and effort savings for domain expert. The method is based on a guided generation approach that employs authoritattive input from reputable sources such as external dictionaries and domain models, to inform the LLMs during the text production process. This method helps to avoid frequent concerns with LLms such as hallucinations, in which the model creates erroneous information, hence improving the reliability and quality of the resulkts, the authors present a full explanation of their methodology, including the ontology annotation process, which combines querying existing new ones as needed.	Increase accuracy and consistency. promote interoperability. Evaluate and refine the approach. Reduce the amount of time spent manually reviewing. S. Contribute to ontology engineering research.	The paper suggests a structured approach for using Large Language Models(LLms) to produce definitions for ontolgy words. Authoritative input - It consists of reputable and dependable information sources that serve as a reference for the LLMs. Specific prompt template - It utilized to assist the LLm in developing defintions. Ontolgy annotation process - load data sources and create searches, which can get external definitions.	In this study they investigated a novel approach to generate definitions for ontology words using Large Language Models(LLMs), while also addressing the inherent problems connected with their use. BY using authoritative input as a guiding framework, our technology dramatically improves the correctness and dependability of the created information, effectively lowering the risk of hallucinations. Implementing this method in an industrial setting has yielded demonstable benefit particularly in terms of efficiency and timnme savings for doma experts entrusted with producing ontology definitions. As a rest the solution not only simplifies the ontology construction procedut it also establishes the framework for future research review and refinement.	domain experts. Investigate how to personalize prompts based on user profiles, domain characteristics and context to improve relevance and intelligibility. Create defined measurews to assess the quality of LLM generated definitions with a focus on accuracy,	incorrect or irrelevant information known as hallucinations. this can result in defintion that do not accurately reflect the intended notions. It may become increasingly difficult to reaction of the creation of knowledge graphs. The paper suggests using LLms to automate term defintion development in an effort to cut down on errors and time. it also provides a useful illustration of effective use.	
20 Alexandru Lecua, Adrian Groza, Lezan Hawizy	Using LLMs and ontologies to extract causal relationships from medical abstracts	The study tries to improve medical knowledge graphs(KGs), with a particular focus on age related macular degenration, using an optimized generative pretrained transformer model, the process consists of multiple stpes, in order to extract entities and interactions associated to AMD, including diseases, symptoms, and treatments, medical abstracta are furst analyzed using structure prompt that directs the model. Before the extracted data is included into the KG using a particular format for relations, users verify its acuuracy as it enhances the models ability to extract causal linkages. The study emphasizes the significance of a well formed dataset. The study also highlights how KGs can organize complicated medical data and support natural languages searches, with the ultimate goal of increasing the precision of answers to AMD relate medical questions.	collect and annotate a corpus of medical abstarcts, giving special attention those from observational studies and clinical trials that have been published during the last ten years. Using the casualAMD ontology as a framework create comprehensive	Fixing the LLM. Collection and annotation of datasets. Composition of the knowledge graph. to Considering and requesting questions.	The study emphasizes how difficult and constrained large language models (LLMs) like chatgpt, are when it comes to drawing conclusions about causality in scientific literature, especially when it comes to age related macular degenration(AMD). the results show that although LLms are somewhat adept at recognizing explicit casual linkages, they have trouble with implicit ones and frequently confuse casuation with correlation. this was supported by earlier studies showing that LLms are frequently unsucessful in differentiating between events that are casually linked and those that are merely correlated as well as by Gao et als evaluation, which observed a tendency for hallucination in chatgpts outputs.	outputs by utilizing knowledge graphs. Reduce the number of hallucinations in which models produce false or deceptive data. Improve LLMs comprehension of counterfactual scenarios and temporal linkages.	The Gpt model may still have trouble comprehending complex medical terminology, even after it has been improved which could result in incorrect interpretations of casual links. The abscence of certain information or connections in the knowledge graph may make it difficult for the model to offer thorough responses. The study emphasizes a basic problem with causal reasoning, LLMs frequently mix up correlation and causation.	
Upadhayay, Ronald Scarpa, Vahid Behzadan	Large Language Models for Automatic Standardization of Cyber Deception Plans based on the Adversary Engagement Ontology	The goal of the open source adversary engagement ontology (AEO) projects is to standradize ideas and practices surrounding adversary engagement in cybersecurity. Simplying the descriptuion and application of cyber deception techniques is the goal of the unified cyber ontology(UCO) program. for the purpose of organizing and carrying out deception campiagns the AEO a number of structures ,including roles, identifies, objectives, acions, deception objects, and storytelling. in order to improve the efficacy of defense tactics, it is intended to main it easier to characterize enemy interactions.	Facilitate communication and comprehension between diverse cybersecurit	To esatblish the adversary engagement ontology(AEO) as a potential unified cyber ontology(UCO) ontology. Recognize tasks with natural language. Generating knowledge graphs and code in response to user input structured ontology data is supplied to the LLM. To provide actors authentic personas to use in deception schemes. Assess how well LLMs produce and precise ontology instances	decision making and operational efficacy in preventing cyber threats by lowering the human labor required for ontology creation.	Examine how to use LLMs to automate the process of creating and improving ontologies. examine how to create increasingly complex cyber deception tactics using LLMs. Examine how AEO can be integrated with different ontologies using the cyber domain ontology framework. Analyze the effectiveness of diffrent LLMs in craeting and analyzing information pertaining to cybersecurity.	chatgpt-4 for ontology alignment tasks, the system may perform well in terms of recall, but its precision is poor. Lusers who are not familiar with ideas about adversary interaction in cybersecurity, uses the AEO as a candidate ontology. The AEOs emphasis on standardization is in line with the goal of our thessi, which is to provide precise cybersecurity defintions and frameworks. better	
22 Patricia Mateiu and Adrian Groza	Ontology engineering with Large Language Models	This study investugates the incorporation of large language models into ontology engineering, particularly by translating natural language (NL) into owl functional syntax using a refined GPT-3 model. The technique structures knowledge from cooking recipes using contextfree grammars and semantic roles allowing parse trees with labeled semantic roles to be produced. further more the LOGICLLAMA tool converts NL to first order logic, improving the precision of the output produced by models such as GPT-3,5 and GPT-4. in order to streamline ontology develoment procedures and lessen the requirements for domain expert contact, the project focuses on creating a protege plugin that translate natural language(NL) into ontology axioms facilitating ontology enrichment. the study shows how effective LLMs may be at ontology engineering task	language) format. To evaluate the effects of different premise declarations and their sequence on the ontology, making sure that only axioms that are required are added prevent the ontology from becoming overwhelmed. To evaluate several fine tuning techniques in order to increase the models precision in producing pertinent ontology axioms.	ontolgical components in order to enhance ontologies. The training dataset helped to improve the GPT- 3 model. Experimented with different combinations of hyper parameters to optimize token accuracy. The model was trained using NL inputs to produce OwL axiom	This study shows that a refined GPT - 3 model can effectively generate ontologies in owl format from natural language descriptions. By removing inaccurate axioms, the second trial demonstrated gains, however it also added needless complexithat might detract from the user experience. In ontology engineering jobs, the protege plugin greatly expedites ontology construction, decreasing the nedd for domain specialists and saving time. appropriate hyper parameter combinations for improved accuracy are guaranteed by the validation procedures, which makes use of a specific dataset of prompt result pairs. subsequent research will concentrate on comparing the effectiveness of ontology engineering with and without the tool emphasizing how it has the potential to revolutionize semantic web technology. In general, this study offers significant perspectives on automating the process of creating ontologies, opening the doc	languagebto ontology translations look at the possibilities of combining different LLMs with ontolog development tools like protege. research methods to enhance LLMs ability to understand context in natural language descriptions especially in specialized fields. Examine technuiques for producing ontologies automatically from various domains. To provide fair and equitable representation of knowledge, research techniques are needed to identify and reduce biases in LLMs while craeting ontologies from natural language.	ideal hyper parameter combination is complex and could involve a lot of trial and error. The validation dataset is essential for evaluating the models performance, but it might not fairly represent the models potential in practical applications if it is not extensive or diverse enough. which is comparable to language servers. The wat that LLMs can efficiently process natural language queries to support ontology construction is explored in our thesis. our reserach can replicate the studys thorough method of optimizing the GPT -3 model for producing NL-FOL couples using a particular datasets	
S	Improving Data Security and Privacy for Ontology Based Data Access	This paper proposes a semantic web-based paradigm that integrates ontology based data acce with ontology based access control to improve data security and privacy in healthcare systems. The model specifies essential components like policy type, actor, action, and constraints in order to construct permission and prohibition policies using the Apache jena framework to facilitate effective querying of heterogenous datab a hospital database is constyructed, and mappings are made between the database and a matching hospital ontology, the concept protects patient privacy by guaranteeing that sensitive information can only be accessed by authorized parties. The paper adresses data access security issues while promoting a strong foundation for managinarge infirmation systems by abstracting access to data sources independent of underlying mappings.	protection, and data access. Create a system that does not rely on certain underlying data models and abstracts access to data sources. make it easier to control access rights for many kinds of data storage systems. implement a vesatile querying system that can manage proactive and reactive.	Framework development Ontology creation database design MApping establishment query execution use case implementation Evaluation	This project improved data access management and privacy be effectively integrating the hospital database with the hospital ontology and policy ontology. The use of sparql searches made it easier to retrieve doctor-patient relationship thorough result that contained names and identifiers. further more the well defined policies for permission and prohibition made sure that access privileges were efficiently controlled, permitting particular actions while preventing unwanted changes, with its strong approach to ontology based data access and ontology based access controlk the suggested moidel whichwas constructed using the apache jena framnework improves data security and protects patient privacy across a variety of healthcare data sources.	Create a framework that combines OBDA and RBA to improve access control systems. to safeguard senstive data, OBDA frameworks should have improved security features. create novel approaches that make use of semantic technology to integrate disparate data sources.	difficult by the need for a thorough ontolgy and the hospital database, which is essential for	The study gave focuses on how to improve data security and privacy in information systems, especially in the healtthcare industry, by integrating ontology based data access with ontology based access control.
Soularidis	Fine-Tuning Large Language Models for Ontology Engineering: A Comparative Analysis of GPT-4 and Mistral	This stduy investigates the division of fundamental texts into chapters for efficient language mode processing with particular emphasis on producing structured Q& A pairs for ontology engineering and investigates the models input constraints presented difficulties which led the writer to divide chapters into more manageble chunks, using prompt engineering to direct the generated process and incorporate visual content into structured formats, a methological approach was used, targetd training greatly improves the models perfromance in producing contextually relevant ontologies, especially in speciallized sectors like search and rescue operations as teh study shown underscoruing the need of domain specific datasets for perfecting models, subsequent research endeavors seek to enhance these approaches for realistic implementaions.	working with domain specific ideas. make use use of exclusive business day using proprietary data, fine tune LLMs to improve perfromnace and protection data privacy, employ advanced prompting techniques to enhance the models ontology product and comprehension, to guarantee the usefullness of the created ontologies in practice incorporate thorough human validation at crucial points in the model traingin and output creation processes, examine	Model fine tuning. Extended experimentation. of Automation of dataset creation	This study highlights the importance of using domain specific datasets to refine large language models for efficient ontology engineering, the contextual comprehension of the approach was improved by dividing basic texts into mangeable chapters, which produced about 60 Q & A pairs per chapter, significant gains in perfromance measures were achieved through the iterative fine tunuing process that used specilaized datasets, the findings show how important focused data is in connecting theoretical ideas with real world applications, opening the door for further devlopments in OE and its incorporation into operational decision support systems for specific domains such as serach and rescue operations for wildfires.	Build working prototypesof SAR helpers that are powered by ontologies. Examine cuttingedge methods for model fien tuning and data preperation. create thorough human validation procedures for the duration of the LLM training cycle.		
ŕ	Circular economy in the construction industry: A systematic literature review	The construction industry significantly impacts the environment, accounting for over 30 % of natural resources extraction and 25% of global solid waste due to its reliance on a liner econom model of take, make, dispose. This model results in marterial being used for single use constructions without opportunities for reuse. however, a shift towards a circuar economy mod is emerging, focusing on maintaining materials in a closed loop to maximize their value and minimize waste. The findings highlights existing knowledge gaps and present a compilation of circular economy practices categorized by life cycle stages, emphasizing the potential for reducing waste and resource extraction in the construction industry.	The primary objectives of this study is to explore the recent advancements the application of circular economy principles within the construction industry. To achieve this, a systematic literature review was conducted, encompassing 45 articles that were categorized into six distinct research areas. The development of circular economy, the reuse of materials, material stocks, and the integration of circular economy concepts in project design and lifecycle assessment analysis. The study aims to identify knowledge gaps in the existing literature, analyze the content of the selected articles and complie a comprehensive table of known circular economy practices tailored to various life cycle stages in the construction sector.	Literature Search Selection Criteria. Data Extraction. Analysis of content 2. descriptive Analysis. categorization of articles Identification of knowledge gaps 3. content analysis	The building industrys shift from a linear to a circular economy offers a huge chance to address the urgent problems of waste production and resource depletion, the industry may improve material reuse, reduce waste, and maximize resource use across the whole lifecycle of constyrcution projects by embracing the concepts of the circular economy, the results of the systematic literature evaluation show both current knowledge gaps and new developments in this subject, highlighting a number of creative activities and research issues, order to fully reap the benefits of a circular economy, it is imperative that stakeholders work together and exchange idea as the sector deveolps.	thorough frameworks that make it easier to incorpora CE principles into building procedures. examining cutting edge techniques fro material reuse is essential. the end of a buildings existence, research should look the possibility of upcycling existing materials and putting in place machanisms that encourage material recovery and recycling, gaining knowledge about the built in environments material stock dynamics can help optimize resource consumption, the integration of CE	the large amount of research on at circular economy merthods in the building industry. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability. The caliber pf the included studies may limit their applicability and	
26 Sultan Çetin , Vincent Gruis , Ad Straub	Digitalization for a circular economy in the building industry	The study highlights numerous fundamnetal hurdles to implementing circular methods, such as the requirements for a suppprtive suppliy chain culture, limited technological capabilities, and the law of acceptable business models. interviews highlighted worries regarding the feasibility of storing data for longterm projects as well as the importance of efficiently balancing supply and demand, according to feedback from different stakeholders including architects and demolition contreated, successful material reuse frequently depends on experiential knowledge rather than analytical data, overall, the study higlights the complexities of shifting to circular practices in housuing as well as the significance of collaboration among many actors in the building and rehabilitation sectors.	regarding the implementing and management of digital tools in the context of circular housing asset renovation and management, specifically the study will look into how social housing organizationa may effectively include DTs into their building stock management processes, the study tries to uncover the obstacles and barriers experienced by these businesses through a series of	Data collection Data Analysis	in conclusion, this study ilustartes the considerable challenges and potential connected with incorporating digital tools and circular processes into the construction business. Interview findings suggest a recurring issue in organisational transformation, with many stakeholders entrenched in existing procedures that resist adaptation. the findings emphasize the need of collaborating among multiple players, such as architect engineers and demolition contractors in order to harness their knowledge in material reuse and sustainability. furthermore, the study recognizes its limitations emphasizing the need for additional research across various organizational sizes and circumstances to supporty the findings.	investigate the role of emerging digital technologies sur as AI, IoT, etc in improving circularity in housing developments. examine collaborative frameworks that encourages circularity among social housing ts, organizations, building firms, and technology providers evaluate the influence of user experience and stakeholder engagement on the uptake of digital tools	ch not represent the full range of viewpoints in the housing sector. The study does not examine how difficulties chnage over time, which is critical for evaluating the long term viability of digital construction tools. Interviewees discussed organizational hurdles in implementing new digital tools. this shows a lack of effective chnage management techniques within firms.	this study is important because it not only fills a significant gap in the literature but it also provides practical insights an recommendations for social housing organizations and policymakers to help them integrate digital tools and circular economy principles into their operations
, Malindu Sandanayake, Pengyun	Sustainability Considerations of Green Buildings: A Detailed Overview on Current Advancements and Future Considerations.	The study used VOS viewer software to depict the research landscape, allowing for the discovery hotspots and potential evolutionary mechanisms within the area. Despite the growing number of studies, the study reveals a considerable research deficit, with many existing papers focusing on specific areas of green building. this study seeks to bridge that gap by presenting insights and recommentations for future resear directions to support sustainable development in green building techniques. the study presents a comprehensive overview of green building research, filling important gaps in the literature and shedding light on future paths for sustainable construction methods.	implementation, and propose future research areas. Employ VOS viewer software to visually represent the network structure of the literature, finding research hotspots and trends in green architecture. Analyze the substance of selected literature to have a better understanding	Visual Analysis Content Analysis	This review emphasizes important advances and persistent problems in the field of green building research. despite the fact that the number of research has increased over the years, there is still asignificant lack in thorough evaluations that include the many facets of sustainable building methods. This study successfully displayed the literatrure landscape using technologies such as VOS viewer, identifying major research hotspots and trends that can drive future investigations. the systematic review offered here tries to close this gap by giving complete understanding of green building areas and their relationships. finally the findings highlight the relevance of a holistic approach to sustainble development, providing significant insights for researchers, policymakers, and stakeholders dedicated to achieving sustainability goals in the built environment.	aspects of green building, rather than focusing solely of one or two. Investigate the interconnection of numerousy aspects, including environmental economic, and social consequences. Investigate the hurdles to widespread implementation green construction practices. Identify solutions to solve these challenges, and provide a road map for practioners and policymakers. Investigate the development of uniform rules and regulations to encourage green building techniques. Analyze the effectiveness of current regulations and	done, limiting our understanding of the interdependence of various aspects of green buildings. More research on the barriers to implementing green building principles is required, as it will guide future academic inquiry and practical implementations. Although a large number of keywords were employed in literature searches, certain developing subjects and keywords may remain unexplored, creating significant bling spots in the study landscape. This study declares its intention to fill research gaps. highlights how our thesis contributes to this goal ,whether by addressing previouisly disregarded areas or by providing fresh insights into sustainable building techniques. Analyze how the review paper's results suppoprt or contradict our thesis findings.	
Cuman, Alberto Bodrato, Ludovica Marenco	From nearly zero energy buildings (NZEB) to positive energy buildings (PEB): The next challenge - The most recent European trends with some notes on the energy analysis of a forerunner PEB example	The conflict over positive enrgy buildings raises various significant issues, particularly those concerning energy management and architectural design. the experimental building in Zurich highlights advances in sustainable construction, with a lightweight shell top, funicular floor, and adjustable solar facade. this construction meets PEB standards with an annual energy need of 3 kwh/m2 and 45% surplus energy generation. furthermore, regular monitoring of internal and exterior variables is required to maintain indoor comfort while optimizing energy output and consumption, the integration of building management systems is critical for increasing energy efficiency and indoor environmental quality, interoperable, low cost wireless communication systems are emphasized as a priority, although more research is needed to develop low power solutions for real time connectivity among building parts.	unneccessary costs while encouraging new business models for energy efficient buildings.	Experimental Monitoring	The study emphasizes the huge gains in energy efficient and sustainability realized by incorporating renewable energy sources into building design. the analyzed building which is fitted with a photovoltaic and a solar thermal system, achieves an outstanding 94% renewable energy coverage, this study emphasizes the role of home automation management systems optimizing energy performance, adjusting to user needs and increasing overall efficiency, it also emphasizes the importance of glazing in energy usage, implying that smart design can great reduce heat loss while increasing comfort.	Examine various design ideas and plant management tactics for increasing energy efficiency and lowering expenses. Investigate the potential of establishing energy independent communities particularly in sparsely	be indicative of other regiuons with varying climates. This limits the generalizability of the findings. The study is based on experimental data and simulations, which may not accurately represent the glazing technologies long term performance generating. Highlights the role of home automation systems in optimizing energy use. Emphasizes the concept of energy independent districts and the value of community participation. The experimental monitoring data mighjt be used as a case study or reference point for our study technique,	The study is relevant as most notably in terms of building energy performnace and the larger implications for sustainability.
and Peter Newman	Critical connections: The role of the built environment sector in delivering green cities and a green economy https://doi.org/10.3390/su7079417	The findings show that design firms are much ahead of the curve in terms of recognizing the strategic value of incorporating sustainability goals into their business plans. This advancement is critical for competing in urban development projects and contributing to environmentally friendly construction results. The poll included a varied range of enterprises. Most of which were based in major australian cities, and responses were obtained from companies of varying sizes. The investigation divided replies into three categories: Design firms, building product manufacturers and construction, and real estate services. This classification allowed for a thorough evaluation of sustainable attitudes and behaviour acrothe industry. The findings are meant to inform ongoing discussions about sustainability in urban planning and development, emphasizing the importance of continued innovation and adapability to meet future problems while remaining within the planets natural buondaries.		Research Design sample population Data collection Data Analysis Limitations Acknowledgements Author contributions Conflicts of interest	The survey results from public and commercial sector organizations highlighting a watershed point in the built environment industrys journey toward sustainability. While the sample is small the findings show a considerable difference difference in the recognition of sustainabilitys strategic importance, particularly among design businesses. These companies are not only developing their business models to embrace sustainability goals, but they are also ready to use this expertise to improve eco efficiency in construction projects. the widespread support for government engagement, along with a preference for incentives over punitive measures demonstrates ashared desire for a collaborating approach to meeting national carbon emission reduction targets.	conditions conductive to low carbon growth. examine the impact of consumer behavior on the pace of innovation in the built environment sector. investigate how these tevhnologies can help with the wicked diifficulties of sustainable development.	The survey questions may not cover all key areas of sustainability thus laeving gaps in data about developing build a green economy. According to the study fresh understanding about sustainable practices can help to build a green economy.	The study is relevant for various reasons, notably in terms of sustainability in the built environment sector. The study reveals significant disparties between hiow public and private firms perceive and implement sustainability goals.
30 Masoud Norouzi, Marta Ch`afer, Luisa F. Cabeza, Laureano Jim'enez, Dieter Boer	Circular economy in the building and construction sector: A scientific evolution analysis	It emphasuzes the construction industrys mahor environmental impact, as it uses almost half of raw materials and contributes significantly to waste and greenhouise gas emissions, the study underlines the sectors urgent need to transition to sustainability through CE, which encourages activities such as reuse, recycling and resource efficiency, the journal of cleaner production and sustainability is a prominent journal, the report outlines five major research areas: energy efficiency, waste management, sustainable development, urban CE, and green buildings, future research directions include novel materials, circular business models, and the integration of CE with industry 4.0 technologies, the report indicates that, while great progress has been made, more international collaboration and new methods are required to advance CE in the construction industry.	development of the literature on circular economy (CE) concepts in the architectural and construction industry between 2005 and 2020. To detremine which nationa and organizations, and prominent writers are making significant contributions to CE research as well as which journal are	Data collection Data Cleaning and filtering Bibliometric Analysis Analysis of Publication Trends Collaboration Network Analysis Thematic Analysis Synthesis Of Findings	The findings show a significant rise in the number of publication especially after 2014, with china emerging as the top contributor, closely followed by european countries like germany and Uk. Energy efficiency, waste management, sustainable materials, and the incorporation of CE principles into urban design and smart city projects are some of the major subject cluters that have been discovered, with a focus on cutting edge business models and technological developments, especially in light of industry 4,0 the analysis emphasizes the multidisplinary character of CE research. There are still gaps in gepgraphic representation and a need for improved cooperated between researchers in various regions, even with the increase in research output. The study emphasizes how crucial it is to conduct more research to fill in these knowledge gaps and investigate the war in which CE practices might support sustainability in the building and construction industry. All things considered, the findings give a thorough picture of the state of CE research today and offer insightful information to scholars, decision makers and business professionals who want tp promote sustainable grow in the building sector.	guidelines, emphasizing environmental impact reduction sustainability, and recyclability. Investigating fresh approaches to business that raise the worth of leftover materials and encourage recycling an=d longterm reuse in the building sector. Investigating how digital tools like building information modeling(BIM), big data analytics, and the internet of things(IoT) may promote resource efficiency and more intelligent building techniques. Concentrating on the application of CE concepts to urban planning and development, especially as they relate to smart cities and industrial symbiosis.	might not include all pertinenet qualitative and quantitative methods.	This study's significance stems from its thorough examination of CE literature, identification of reserach gaps, and capacity to influence both theoretical and applied perspectives on sustainability in the building industry.
A. Eladl, Bilal Naji Alhasnawi, Saad	Energy management system in smart buildings based coalition game theory with fog platform and smart meter infrastructure	The study introduces a comprehensive energy management system for smart buidings that maximizes energy distribution and reduces waste by leveraging fog computing and coalition gan theory, the crucial problem of balancing energy surplus and deficit among buidings is addressed and a two scenario method is suggested. In order to provide smooth connection and data gathering between buidings and the central management unit, the EMS makes use of smart meters, large energy waste reductions are shown by simulation findings, and a comparison of scenarios shows that coordinated energy management can result in large electricity savings, by integrating fog computing, scalability and speed are improved allowing for real time processing and efficient handling of big datasets, and increased productivity.		1	This study effectively illustrates the efficacy of a centralized energy management system for smart buildings by optimizing energy distribution through the use of fog computing and coalition game theory. The findings show that energy waste has been decreased and that energy demands have been more effectively managed throughout a ten building simulated smart city, energy imbalanc were successfully managed by the EMS by using the shapley value for equitable distribution of excess energy, guaranteeing that buildings with extra generation could assist those with deficits, according to the performnace evaluation the EMS improved total resource consumption and reduced reactuon and delay times when compared to conventional energy management techniques.	ability to combine energy from multiple sources, such grid connections storage systems and renewable energy. Enhancing the precision of energy demand forecasts be creating sophisticated alghorithms for real time load forecasting. Investigating strategies for controlling the uncertainty associated with energy production and use. Evaluating how well the EMS framework can be scale to larger and more intricate metropolitian settings.	The study mostly uses simulations in a Utilizing smart technology to improve resource name fictitious ten building smart metropolis, which might not accurately represent the intricacies and variations of real Utilizing smart technology to improve resource name and efficiency in the built environment is the main goal of both the EMS and our thesis. In order to organize and classify the data related to	

32 Muhammad Naeem, Wilson Ozuem, Kerry Howell, and Silvia Ranfagni	A Step-by-Step Process of Thematic Analysis to Develop a Conceptual Model in Qualitative Research https://doi.org/10.1177/16094069231205789	constructivist, positivist, grounded theory, ethnography, and interpretive phenomenology.	Create a systematic, six step approach for thematic analysis in qualitative research that leads to the development of a conceptual model. Improve the rigor and transparency of thematic analysis by providing clear instructions for each phase, including data familiarity, ketword selection, coding, theming, interpretation, and model construction. Demonstrate how the proposed procedure may be applied and adapted to diverse qualitative methodologies, including constructivist, positivist, grounded theory, ethnography, narrative, and descriptive approaches.	Theme Development Conceptualization Through Interpretation	for thematic analysis, which improves the rigor and transparency of qualitative research. By combining inductive and deductive coding methodologies, the study provides a thorough framework for a nuanced analysis of qualitative data, ultimately leading to the development of a strong conceptual model. This study enhances the area of qualitative research by giving a	be combined with quantitative methods to improve data interpretation and provide a more complete knowledge of research concerns.		The study on thematic analtysis in qualitative research is extremely important for a variety of reasons, particlularly in terms of building a strong technique for analyzing qualitative data.
33 Eva Blomqvist1, Huanyu Li, Robin Keskisärkkä, Mikael Lindecrantz, Mina Abd Nikooie Pour, Ying Li, and Patrick Lambrix.	Cross-domain Modelling – A Network of Core Ontologies for the Circular Economy	production, logistics, and industry sectors. The authors suggest a modular ontology network based on ontology design patterns(ODPS), a patterns language, to allow for flexible, reusable, and extensible representations of CE concepts.		Ontology engineering methodology FAIR ontology publishing	allows for customizable solutions that match the varying needs of various businesses. The findings emphasize thenecessity of			This paper is important becuase it addresses the hard challenges of semantic interoperablity in the circular economy using a modular ontology network.
34 E.M. Sauter, R.L.G. Lemmens, P. Pauwels	CEO & CAMO Ontologies: a circulation medium for materials in the construction industry	This comprehensive article investigates how semnatic technologies, specifically ontologies and linked data, might improve building material cycling within the circular economy paradigm in the construction industry. it calls for the transformation of traditional building material passports into a decentralized, networked data ecosystem that improves transparency, reusabliity, and cross disciplinary connections, ultimately promoting CE compliant sustainable construction practices.	Develop common ontologies Integrate material passports facilitate data interoperability	Gathering material passport as data sources Ontology creation Conversion to RDF Querying Via SPARQL Additional Considerations	The study adds significantly to the understanding and use of circular economy ideas in the building business. By utilizing semantic technologies, it lays the path for a more sustainable future in which building materials are reused and recycled efficiently, lowering environmental impact and encouraging responsible resource management.	Investigate how the generated ontologies can be combined with building information modeling (BIM) systems and internet of things(IoT) technologies to improve data interoperability and real time material tracking. Investigate potential new business models resullting from the usage of material passports and linked data technologies, with an emphasis on value generation for manufactures, contractors, and end users.	The proposed ontologies rely substantially on the development of technical standards within the building community. the report doesnot give a full examination of the costs associated with implementing the proposed large scale configuration. without a common framework, integrating several data sources can be difficult, resulting in discrepancies and interoperability concerns	The journal paper described is crucial for a number of reasons, most notably in terms of furthering the circular economy (CE) in the building industry.
_	SmartTags: IoT Product Passport for Circular Economy Based on Printed Sensors and Unique Item-Level Identifiers https://doi.org/10.3390/s19030586		Semantic Models and Ontologies	Design of SmartTags QR Code Generation Sensor Activation Laboratory Testing Performance Evaluation Thermochromic Ink Evaluation Photochromic Ink Evaluation Data analysis and Calibration Use Case Implementation	for more accurate product identification and environmental changes such as temperature and light to give a dynamic method of tracking and managing products throughout their lifecycle. The findings show that smartTags can encode crucial information such as item identity and sensor state, enabling a	Create new QR code standards that address the unique needs of smartTags, notably in terms of incorporating functional ink data. Investigate and optimize thermochromic and photochromic ink composition to increase duarblity and performace in a variety of environments. create systems that allow smartTags to moitor and respond to contextual chnages in the products lifetime, such as usage conditions and length.	ink formuation and their intercations with different surfaces could provide valuable insights into improving durability and funtionality. The study did not fully investigate the economic effects of deploying smartTags in	The study on SmartTags is highly relevant for various reasons, notably in terms of emerging technology and sustainable practices within the circular economy.
36 Kedir, Firehiwot, Bucher, David F., Hall, Daniel M.	A Proposed Material Passport Ontology to Enable Circularity for Industrialized Construction https://doi.org/10.35490/EC3.2021.159	industrialized construction, with its product platforms and standardized procedures, has enormous potential to support CE, but it is hampered by a lack of strutured infromation sharing. material passport are proposed as methods for capturing and sharing detailed product data, hence promoting circularity. Existing MP techniques are fragmented and insufficiently wide,	Develop material passport ontology Identity key information requirements Enhance data sharing and collaboration Address implementation challenges Demonstrate conceptual use of the MPO Support Lifecycle management Facilitate stakeholder responsibility mapping	Detremine ontologys domain and scope Review, reuse, and merge ontological resources Develop the material passport ontology Preliminary Valiadation	The MPO provides a strong framework for improving collaboration and responsibility among construction actors by incorporating existing ontological resources and adapting them to the specific needs of industrialized building, the MPO s preliminary validation demonstrates its ability to fulfill the industrys different needs, paving the path fir future study to finetune its implementation of the MPO can have a substantial impact on the sustainability and efficiency of construction methods advocating a circular approach that reduces waste while increasing resource usage.	Investigate the possibility of connecting the MPO with emerging technologies like building information modeling(BIM), the internet of things(IoT), and blockchain to improve data accessibility, traceability, and security. Invsetigate actual MPO implementation tactics in real world building projects with a focus on obstacles and best practices for data gathering, sharing, and management by stakeholder.	The report notes that data accessibility levels and property value limits have not been fullt addressed. The functional classes indicated in the MPO may be incomplete, missing essential features of material data that must be recorded for a comprehensive material passport. Both studies seek to promote sustainable and circular yes economy ideas in the built environment. The MPO accomplishes this by establishing a framework for tracking materials and their possible reuse, where as the OBACM can supplement these efforts by ensuring that data access promotes sustainable behaviours and regulatory compliance.	The material passport ontology study is relevant because it offers a structured way to managing material data, supports circular economy practices, improves stakeholder engagement, and tackles the complexities inherent in modern building goods.
37 Cogan Shimizu , Karl Hammar and Pascal Hitzler	Modular ontology modeling https://doi.org/10.3233/SW- 222886/FORMAT/EPUB	This paper introduces and advocates for the Modular Ontology Modeling (MOMo) methodology, aimed at improving the reusability, clarity, and maintainability of ontologies within the Semantic Web. The authors argue that widespread reuse of ontologies is hampered by issues such as varying representational granularity, conceptual ambiguity, poor adherence to modeling principles, and lack of tooling support. MOMo, supported by tools like CoModIDE, builds on previous design paradigms—particularly eXtreme Design—but emphasizes modularity, graphical schema diagrams, and process support for knowledge engineers and domain experts.	ontology engineering practices	1. Participant Preparation 2. Data collection 3. Modeling Task 4. Survey 5. Metric Evaluation 6. Statistical analysis 7. Qualitative Analysis	improves understanding, flexibility, and maintainability. Future directions include integrating spatial modeling techniques, automatic pattern instantiation, ontology alignment, and	techniques, and improved collaboration tools for distributed teams.		The study on Modular Ontology Modeling is highly relevant to the development of an Ontology-Based Access Control Module.