Sustainable Knowledge Management Regarding Startup Innovation: A Review

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Abstract

In the dynamic landscape of modern business, effective Knowledge Management (KM) has become crucial for success, particularly for Small and Medium-Sized Businesses (SMBs) and startups. This paper explores the significance of KM in SMBs and startups, emphasizing its role in contributing to Sustainable Development Goals (SDGs). KM involves systematically managing intellectual assets to create value, improve efficiency, and enhance competitiveness. SMBs, despite resource constraints, can benefit significantly from KM by enhancing decisionmaking, streamlining processes, and fostering innovation. The integration of KM in SMBs leads to improved operational efficiency, faster problem-solving, and a more responsive organizational culture. The paper also highlights the link between KM and SDGs, emphasizing the positive impact on education, economic growth, and sustainable development. The methodology involves a systematic literature review to identify critical success factors and barriers affecting the use of KM practices in startups for sustainability. The results show a growing interest in KM in recent years, particularly in the context of the COVID-19 pandemic. The study includes a comprehensive analysis of document trends, country contributions, authorship, and subject areas related to KM in startups. The findings underscore the need for a holistic approach to KM, considering technological advancements, organizational culture, and human capital for sustainable innovation in SMBs and startups.

Keywords: Knowledge management, sustainable, startups, innovation

1 Introduction

In the dynamic landscape of modern business, the effective management of knowledge has emerged as a crucial factor for success. Knowledge Management (KM) plays a pivotal role in harnessing and leveraging the intellectual capital within organizations [1]. This essay delves into the significance of Knowledge Management, particularly in the context of Small and Medium-Sized Businesses (SMBs), and explores how this strategic approach can contribute to the attainment of Sustainable Development Goals (SDGs). [2]

Knowledge Management is a multidisciplinary approach that involves the systematic management of an organization's intellectual assets to create value, improve efficiency, and enhance competitiveness. KM encompasses processes, technologies, and strategies to capture, organize, share, and apply knowledge within an organization. [3] This involves not only explicit knowledge, such as data and documents, but also tacit knowledge, which is embedded in the minds of Sustainable Development Goals (SDGs).

Small and Medium-Sized Businesses (SMBs), also referred to as Small and Medium Enterprises (SMEs), form the backbone of economies worldwide. These businesses, characterized by their relatively small workforce and revenue, play a vital role in fostering innovation, creating employment opportunities, and contributing to economic growth. However, SMBs often face resource constraints, making it imperative for them to adopt efficient and targeted strategies for sustainable growth. [4]

The Sustainable Development Goals (SDGs) are a set of 17 global objectives established by the United Nations to address pressing social, economic, and environmental challenges. [5] Adopted in 2015 as part of the 2030 Agenda for Sustainable Development, the SDGs aim to eradicate poverty, promote equality, ensure environmental sustainability, and foster peace and justice. The goals provide a comprehensive framework for nations, businesses, and individuals to contribute to creating a more sustainable and equitable world. [2]

For SMBs, effective Knowledge Management can be a game-changer. By systematically capturing and leveraging the knowledge embedded within their workforce, SMBs can enhance decision-making, streamline processes, and foster innovation. KM tools and techniques, such as knowledge repositories, [6] collaboration platforms, and mentorship programs, enable SMBs to create a learning culture that adapts to change and harnesses the collective intelligence of their employees. [7]

The integration of KM in SMBs can result in improved operational efficiency, faster problem-solving, and a more responsive and adaptive organizational culture. [8] Moreover, by facilitating the transfer of knowledge across generations of employees, SMBs can mitigate the risks associated with talent turnover and build a sustainable foundation for growth.

The link between Knowledge Management and the Sustainable Development Goals lies in their shared emphasis on leveraging human capital and fostering innovation for sustainable growth. [9] KM practices contribute to several SDGs, including Goal 4 (Quality Education), Goal 8 (Decent Work and Economic Growth), and Goal 9 (Industry, Innovation, and Infrastructure). By enhancing the knowledge and skills of their workforce, SMBs can positively impact education and employment opportunities, promoting inclusive economic growth. [10]

Furthermore, the efficient use of knowledge resources can lead to responsible consumption and production (Goal 12) by minimizing waste and optimizing processes. Collaboration and knowledge sharing within and between organizations can also contribute to Goal 17 (Partnerships for the Goals), fostering collective action for sustainable development.[11]

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In conclusion, this essay will focus on the dynamic landscape of modern business underscores the pivotal role of KM in unlocking the intellectual capital within organizations, particularly for Small and Medium-Sized Businesses (SMBs). As the backbone of economies worldwide, SMBs face resource constraints, making efficient strategies essential for sustainable growth. Being possible the integration of KM in SMBs proves to be a game-changer, enhancing decision-making, fostering innovation, and building a learning culture. This strategic approach not only improves operational efficiency but also aligns with the Sustainable Development Goals (SDGs), contributing to objectives such as Quality Education, Decent Work and Economic Growth, Industry, Innovation, and Infrastructure, as well as Partnerships for the Goals. By systematically leveraging knowledge resources, SMBs can mitigate talent turnover risks, optimize processes, and play a significant role in promoting inclusive economic growth and responsible consumption and production, thus contributing to a more sustainable and equitable world.

2 Methodology

For this systematic and bibliographic review, we have mainly searched articles between the last five and fifteen years in the field of knowledge management in start-ups.

To conduct a rigorous and comprehensive systematic literature review on the relationship between knowledge management and sustainability in startups, the following methodology [12] can be employed:

1. Formulate the Research Question: Clearly define the research question and objectives to investigate the relationship between knowledge management and sustainability in startups. The primary goal is to identify critical

- success factors and barriers affecting the usage of knowledge management practices in startups for achieving sustainability.
- 2. Search Strategy: Utilize databases such as Scopus, ScienceDirect, Google Scholar, Mdpi, and Emerald Insight. Employ search terms like "knowledge management," "startups," "sustainability," "sustainable," "systematic review," "operational process," and "organization process." Prioritize articles published within the last ten years to ensure the inclusion of recent research.
- 3. Inclusion and Exclusion Criteria: Establish clear inclusion and exclusion criteria. Include peer-reviewed articles and book chapters published in English, focusing on the relationship between knowledge management and sustainability in startups, providing empirical evidence or case studies, and not being duplicate publications. Exclude papers not written in English or duplicate publications.
- 4. **Screening Process:** Assess relevance based on titles, abstracts, and full texts. Utilize two independent reviewers to minimize random or systematic errors in the screening process.
- 5. Data Extraction: Extract various elements such as author(s), publication year, research methods, key findings, and the relationship between knowledge management, startups, and sustainability from the selected articles. The figures depicting interconnected keywords around the world were generated using an automated bibliometric analysis tool, VOSviewer. The process began with the retrieval of relevant bibliographic data related to knowledge management, startups, and sustainability. This data was then formatted appropriately for analysis. The automated application, VOSviewer, was employed to import and analyze the data, automatically creating a network representation based on co-occurrence patterns. The tool performed normalization, clustering analysis, and visualization settings automatically. The generated figures represent a visual overview of global keyword connections, offering insights into co-occurrence patterns and thematic clusters within the domains of knowledge management, startups, and sustainability." This concise explanation acknowledges the automated nature of the tool and emphasizes the efficiency and accuracy it brings to the bibliometric analysis process.
- 6. Synthesis Process: Uncover patterns, trends, and connections within the selected studies to better understand the relationship between knowledge management, startups, and sustainability. The methodology for generating Tables 1, 2, and 2 involves a systematic approach to search strategy and keyword analysis. In Table 1, descriptors such as "knowledge management," "startups," and "sustainability" were employed across databases like Scopus and ScienceDirect. The occurrence of each descriptor and the number of articles found were meticulously recorded. Table 2 extends this strategy to additional databases like Mdpi and Emerald Insight, providing a comprehensive overview of the search results. Table 3 focuses on keyword filter analysis, where keywords like "business," "model," and "innovation" were

assessed for occurrence and relative frequency. Statistical analyses, including Excel calculations for descriptive statistics and visualizations, were integral to presenting the data clearly. The inclusion of table footnotes enhances the interpretability of the presented information, ensuring transparency and replicability in the systematic literature review process.

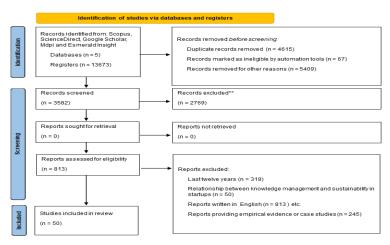


Fig. 1 PRISMA flowchart for the selected article

By following these steps, the systematic literature review will be conducted in a rigorous and replicable manner, ensuring a comprehensive and unbiased approach to the research.

Table 1 Strategy of Search performed

	De		DataBases/searchers ²			
Hip	knowledge management	Startups	Systematic Review	Sustainable	"operational process	knowledge
occurrence Founded selected	$ \begin{array}{r} 31 \\ 2,251,689 \\ 50 \end{array} $	21 2,251,689 50	$ \begin{array}{r} 11 \\ 2,251,689 \\ 50 \end{array} $	6 2,251,689 50	10 2,251,689 50	$ \begin{array}{r} 31 \\ 2,251,689 \\ 50 \end{array} $

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3 Results and Discussion

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Table 2 Strategy of Search performed

	Descript	DataBases/searchers ²				
Hip	knowledge management	Startups	Scopus	ScienceDirect	Mdpi	Esmerald Insight
1	1	1	1	1	1	1
1	1	1	50	2,251,689	27	2,251,689
1	1	1	30	50	17	50

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		Strategy of Search per- formed				
keywords	Occurrence	Scopus	ScienceDirect	Mdpi	Esmerald Insight	GScr
Knowledge management	25	9	9	2	3	0
strategic	2	1	0	0	1	0
Busines	8	3	3	1	1	1
model	5	4	2	0	1	0
StartUp	8	5	1	1	0	1
Innovation	12	8	2	1	0	1

Table 3 Keywords filter analysis for the fifty selected references

In Figure 1, we present the number of documents per year in the field of study of knowledge management in start-ups. Note that the peak of interest in investigation in the subject is in the years 2021 and 2022. This is reasonable because, these years, the COVID-19 pandemic arose all over the world. In fact, many startups and small and medium-sized enterprises were in constant danger of going bankrupt, and many of them did, which was later reflected in the negative effects on the economy worldwide [13].

In Figure 2, we present the number of documents in the area in front of the country and territory. As is possible to see, the most contribution or participation in the last five years is Brazil, followed by China. An interesting fact here is that when we perform the search with publication year filtered if we extend the range of interest to the last two decades, we will find that the United States ranks number one. This is an indicator that in the last five years, the United States has lost interest, inversion, and efforts to research the factors that allow a start-up to develop and grow with success. The selected articles from the research with 23 articles found in Scopus for the last five years are the references[10, 14–21].

The map in Figure 4 corresponds to the co-author contribution obtained from the initial data of 2,251,689 documents found in the Scopus database. Once we have

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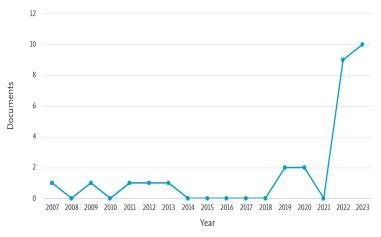


Fig. 2 Perspective Documents by year of the last fifteen years in the study of management of startups

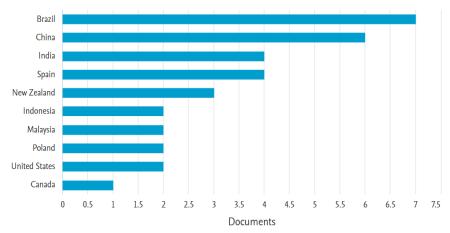
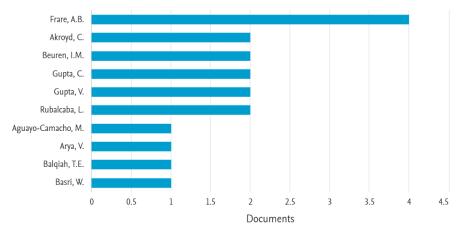


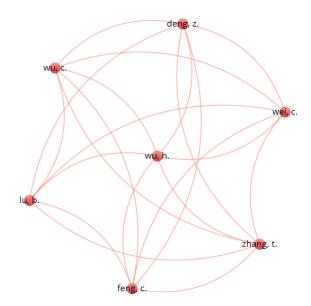
Fig. 3 Documents by country or territory around the last fifteen years

obtained the co-author collaboration map according to the bibliographic information, we can conclude that the most important node in the connection is in the middle of the map, and the author is Wu. H. The central author makes the rest of the connections possible, which, in this case, represent the contributions of the different authors.

In Figure 5, we can see that the highest subject area in our data is in the business and management in start-ups, with a 32.0 % followed by the area of social sciences with 16 %. Decision Science represents a 12% rate throughout these last fifteen years in the research of knowledge management for Startups [22]. Then, the Economics and Computer Sciences areas are found in the middle, with 10%.



 $\textbf{Fig. 4} \quad \text{Documentos by Autor in the study of knowledge management of start-ups in the last fifteen years}$



 $\textbf{Fig. 5} \ \ \textbf{Interaction of Author's Contribution in the Knowledge Management of Start-ups the Last Fifteen Years}$

Namely, knowledge management is highly studied for companies with a very selected approach to the Business, inclusive the interest in learning how to administrate with success a business is higher than the environmental sustainability interest since the last one in the rate of space-time around of fifteen years just present an 8.0% As it has been stated, there are various determinants for achieving innovative solutions through sustainable KM in business and other institutions. Moreover, these

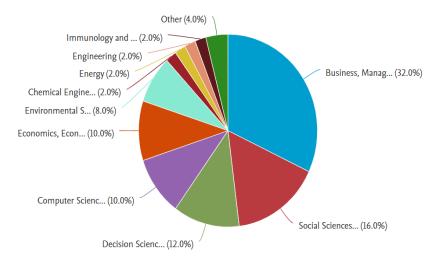


Fig. 6 Documents by Subject Area for the advanced research

factors could also establish if these activities will lead to success or failure as they have been exposed and studied differently. Nevertheless, it was possible to highlight the coincidences and agreements of the current issue. In fact, a necessity to merge technology, processes and people research lines has been the fundamental basis for KM investigation development [23].

Furthermore, the acknowledgment of information gaps and complexities for each situation (i.e, start-up, business, public or private institution.) would permit sustainable considerations for achieving internal or external goals [24][25]. Indeed, the improvement of KM capabilities would depend on how institutions are willing to take risks and their interaction with the source of these learnings; if they are from outside or inside [26]. As a result, KM activities should consider both outer and inner conditions to perform innovation in any of the fields to be applied [27, 28].

Particularly, incubators and accelerators will commonly have a crucial role as referents of tacit knowledge and relational capital focused in organizational growth and financial competence for the early stages of start-ups and future innovation [29][30]. For this reason, it is possible to recognize the valuable contributions of embracing foreign instruction. Even though indoor upgrades in the companies or establishments, such as technological vanguard, would lead to the more efficient and creative transference of knowledge [23][31]. Consequently, sustained structures of human capital would eventually manifest in different forms as they could by these conjunctures.

It is not only defined by how the information flows internally and externally but also by how the personnel interacts between them and reacts to this process, their environment, and incentives. For instance, knowledge-sharing behaviors and collaborations can be driven by subsidies and immediate leadership reinforcements, which can also be learned and memorized in order to support innovation projects and intellectual protection[32][33][34]. Therefore, human resources and the underlying states in

which they execute their utility are also primordial for the identification of sustainable KM [35–37].

In the quest for innovative solutions, the area of KM, emerges as a key driver for SMBs and startups. A comprehensive overview by Razmerita et al. [38] emphasizes KM's competitive advantage by efficiently capturing, reusing, and leveraging both tacit and explicit knowledge. KM plays a crucial role in the success of these organizations, offering proficiency through self-awareness, strengths, and values alignment. Technological implementations, such as KM systems and Enterprise Resource Planning, are also recurrently identified as valuable repositories for best practices and lessons learned.

Namely, communication technologies, such as email and social media, are pivotal for knowledge workers, with the adoption of newer platforms indicating a shift in communication patterns. Moreover, social technologies enhance collaboration, improving productivity for resource-constrained SMBs and startups. Motivating individuals to participate in knowledge exchange is vital for KM success, with network-centric collaborative approaches facilitated by social media offering cost-effective alternatives to traditional KM systems [39]. SMBs and startups can leverage these platforms to create new knowledge through social collaboration, contributing to success in a dynamic business landscape.

However, the profitable implementation of KM faces challenges, as outlined in Milosz and Elzbieta [40]. To illustrate, this study focuses on Polish SMEs, highlighting the growing awareness of KM and the need for its effectiveness. Barriers and success factors include issues related to knowledge creation, utilization, encoding, storage, intellectual property, and organizational structure. Despite growing awareness of KM's significance among Polish companies, many are characterized as having chaotic knowledge. While acknowledging the importance of KM in large organizations, the research emphasizes the need for effective KM in SMEs, particularly in Poland, where most companies fall into the SME category. Additionally, a notable percentage of SMEs do not include KM in their development strategies, suggesting potential unpreparedness for KMS implementation, particularly in the Lublin region.

Further emphasizing the pivotal role of KM in driving innovation, Nowacki and Bachnik [41] addresses challenges SMBs and startups face in securing a competitive advantage. KM is identified as crucial for enhancing innovative capacity and competitiveness. This sentiment is echoed by Wang and Yang [42], whose study validates a model of KM success for SMEs, stressing the importance of system quality, knowledge quality, service quality, and user satisfaction for management performance and organizational success in the knowledge economy.

The application of KM extends beyond traditional boundaries, as demonstrated by Kivits and Furneaux [43]. While primarily discussing challenges in implementing Building Information Modeling (BIM), the text indirectly underscores the importance of KM for startups facing technological challenges. For instance, Ramdass and Krishnaveni [44] sheds light on the impact of knowledge management on SMBs and startups in the pump manufacturing industry. The study emphasizes the role of IOT infrastructure, organizational structure, and knowledge utilization in improving work performance and contributing to sustainability.

Challenging conventional beliefs, Presutti et al. [45] discusses the significance of cognitive-social proximity over geographical proximity for startups. Strong interactions, trust, and compatible systems are identified as crucial for knowledge spillovers in global relationships. Hence, once again, the importance of stakeholders and their interplay with businesses or institutions are accentuated due to KM's transdisciplinary nature and its base on knowledge interchange. In addition, the pathways to achieve sustainable frameworks are contingent on the constant metamorphosis of these associations.

Exploring the impact of KM systems on SMBs and startups, El Said [46] focuses on the antecedents of performance impact within the Task-Technology Fit model. Cultivating a culture of knowledge sharing and involving users in system implementation are highlighted for successful KM outcomes. In the digital era, as highlighted by Buntak and Kovačić [47], KM becomes even more critical for the survival and growth of SMBs and startups. Challenges and solutions in the digital era, including AI integration and knowledge mining from big data, are discussed, further underlining the evolving nature of KM in the pursuit of innovation and sustainability.

For example, the reference?? mainly discusses and analyzes the growth of Thailand's logistics and distribution tech startups. The document explores the influential factors that contribute to the growth of these startups in Thailand, as the country aims to become a regional startup hub. The research design involves a quantitative method, where a questionnaire was distributed to managers in logistics tech startups in Thailand. The data collected were analyzed using Confirmatory Factor Analysis (CFA) and Structural Equation Model (SEM).

The study results show that factors such as sensing technological options, scaling and stretching, co-producing and orchestrating, and business strategy significantly influence the growth of startups in Thailand. However, factors such as sensing user needs, conceptualizing, and strategic flexibility do not significantly relate to startup growth. The document highlights the importance of providing the right technological solutions for people's lives in order to accelerate the digital economy driven by tech startups in Thailand. The table of contents provides a detailed overview of the document, including a literature review of the various factors affecting startup growth and the research methods and materials used.

Significant factors in the growth of logistics technology startups in Thailand are the perception of technology options, scaling and extension, co-production and orchestration, and business strategy. These factors have a significant influence on the growth of startups in Thailand, according to the results of a study that used confirmatory factor analysis (CFA) and structural equation modeling (SEM) to analyze data collected from questionnaires distributed to managers of logistics technology startups in Thailand [7a][1]. However, factors such as customer needs perception, conceptualization and strategic flexibility do not significantly relate to startup growth??.

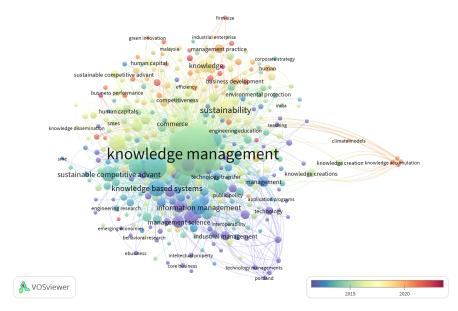
In summary, Thailand's key factors in the growth of logistics technology startups are the perception of technology options, scaling and extension, co-production and performance, and business strategy [7b][7c].

From reference??, dual network embedding in maker spaces and dual entrepreneurial bricolage positively impact the knowledge creation performance of

startups. Network embedding provides access to external resources and promotes cooperation and knowledge sharing. In turn, dual entrepreneurial bricolage enables the improvisation and integration of resources to drive innovation and performance. These findings provide valuable guidance for knowledge management in maker space environments.

Entrepreneurial collaboration involves improvising and integrating existing resources to solve problems and pursue new opportunities. It is a crucial strategy for companies to overcome resource constraints and foster the creation of knowledge and economic benefits [5].

Altogether, these are examples of KM creating new entrepreneurial and institutional strategies to trigger innovation through technology, processes, and people [48]. As a consequence, it is clear the relationship KM will develop along with sustainability and its social, economic and environmental principles. In spite of this intrinsic relationship, it's been clear the lack of research around how this acquaintance and interdependence is developed in different contexts [25]. Consequently, this review is willing to exhibit the actual interlinkage in the current state of the art on the topic, as visualized in figures 7 and 8 for Scopus database obtained by contemplating few key words such as; knowledge management, sustainable and business.



 $\mbox{\bf Fig. 7} \mbox{ TITLE-ABS-KEY ("knowledge management" AND (sustainable AND business)) Scopus network map by year of publications.$

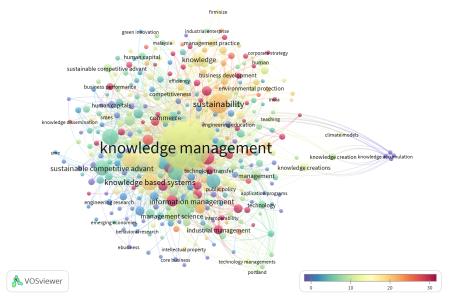


Fig. 8 TITLE-ABS-KEY ("knowledge management" AND (sustainable AND business)) Scopus network map by citations of publications.

4 Conclusion

Briefly, KM can improve start-ups' performance, as it has been demonstrated worthy for different businesses and institutions, concerning the holistic interrelation of the technological, social, and economic backgrounds [49, 50]. For this reason, the pursuit of more sustainable solutions in these corporations is fundamental to aspiring KM revolutions. In addition, the development of new research for sustainable KM should examine its intersectionality along with SDGs and the organizational context for each case

Business bricolage involves improvisation and integration of existing resources to solve problems and take advantage of new opportunities. It is a crucial strategy for companies to overcome resource constraints and foster knowledge creation and economic benefits. Significant factors in the growth of logistics technology startups that we can conclude from this work are the perception of technology options, scaling and extension, co-production and orchestration, and business strategy. These factors significantly influence the growth of international startups; according to the results of this study, some sophisticated statistical methods are confirmatory factor analysis (CFA) and structural equation modeling (SEM), commonly used in the analysis of the data collected from questionnaires distributed to managers of logistics technology startups.

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