

## Design Thinking and Innovation strategy by SMEs for competitiveness: a review

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### Abstract

Throughout the world, small and medium-sized enterprises (SMEs) are recognized as integral components of the economic landscape. Historically focused on domestic markets, since the late 1990s, SMEs have found themselves operating within a globalized marketplace characterized by increasingly discerning customers and intense competition. This newfound global exposure presents a considerable challenge for SMEs, given that many of them possess limited resources and capabilities, often lacking the capacity to establish and sustain a structured innovation management system. In light of this backdrop, this paper embarks on a systematic literature review aimed at exploring the nexus between Design Thinking, innovation, and competitiveness within the context of SMEs. The study involved the retrieval of 308 papers published between 1998 and 2021 from ISI Web of Science – Current Contents. These papers underwent comprehensive analysis with the help of Endnote 20 and NVivo 20, encompassing both bibliometric and content-based analysis. Subsequently, a refined sample of 70 papers, directly related to the research question, was isolated following the application of the exclusion criteria. The findings of this study underscore the need for the development of an innovation framework tailored specifically to SMEs, to seamlessly integrate Design Thinking processes while maintaining alignment with overarching corporate strategy. This holistic approach to innovation management is poised to play a pivotal role in enhancing the competitive standing of SMEs in today's complex and dynamic business landscape.

**Keywords:** Design Thinking, SME, Innovation, Systematic literature review, Innovation strategy

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## 1. Introduction

New technologies and evolving markets have been posing new challenges and opportunities for companies. The significance of corporate innovation management is on the rise, even for small and medium-sized enterprises (SMEs), which often struggle with resource constraints while playing a pivotal role in their respective nations' economic landscapes, a role expected to persist in the near future (van de Vrande, de Jong, Vanhaverbek, & de Rochemont, 2009).

This study addresses a relevant research gap marked by heightened interest but a scarcity of comprehensive overviews concerning the realm of Design Thinking within SMEs, including its implications for innovation capacity (van de Vrande, de Jong, Vanhaverbek, & de Rochemont, 2009).

This type of research inquiry is well-suited to literature reviews, which offer an orienting service, elucidate connections and disagreements in prior research, and establish a grasp of the theoretical concepts and terminology within the field (Williams, Clark, Clark, & Raffo, 2020). Notably, prior literature reviews fall short in filling this particular research gap, as indicated by the ensuing results from our systematic literature review, presented in the subsequent sections.

The decision to conduct a literature review is typically motivated by three primary factors: the nature of the research interest, the attributes and scope of preceding reviews, and the phenomenon of information proliferation (Williams, Clark, Clark, & Raffo, 2020). In today's information-rich environment, maintaining a comprehensive understanding within specialized domains is a daunting task due to the sheer volume of available data, often challenging to access.

The choice of a systematic review methodology, particularly in terms of its complexity, hinges on the primary research objective and the overarching constraints of the research context (Crossan & Apaydin, 2010). The most important considerations for the preparation of a systematic literature review chiefly revolve around formulating a clear, focused research question, as all subsequent processes hinge directly on its formulation.

For this study, a broad research question aligns with the overarching aim of comprehensively exploring the research field, particularly the developments within innovation strategy (Wardati & M., 2019). Given the comprehensive scope of this work and its specific focus on innovation strategy within the framework of Design Thinking, intentionally broad research questions have been posed:

- Which factors contribute to shaping a Design Thinking innovation strategy, and how can they be systematized?
- What obstacles and barriers are responsible for the failures encountered in implementing systematic innovation management systems within organizations?
- How has the scholarly output pertaining to the Design Thinking innovation strategy evolved concerning the specific case of SMEs?

To address these questions, this paper is organized as follows. First, it introduces the concept of design thinking within the context of SMEs. Subsequently, it outlines the methodology employed and presents the findings from the systematic literature review. Finally, it discusses the implications of the results and presents the conclusions.

## 2. Creative Development Approach Design Thinking in SMEs

In the realm of SMEs, the role of entrepreneurs is key for the implementation of Design Thinking. This has a bigger significance compared to large corporations since it can be reasonably assumed that within SMEs, the introduction of Design Thinking into a single department is unlikely to occur without the knowledge and endorsement of the entrepreneur. In SMEs, the entrepreneur bears the responsibility for the successful execution of innovation strategies, including Design Thinking (Mortati & Cruickshank, 2011).

The level of commitment from the entrepreneur is high. While in larger organizations, especially during the initial stages of a project, implementation can commence on a smaller scale, eventually garnering support from top management as initial project results materialize (Judy & Savatore, 2011), SMEs need the focus and direct involvement of the entrepreneur in operational aspects as a prerequisite for Design Thinking implementation (Geldermann, Lerche, & Sepulveda, 2018).

Furthermore, if, in addition to the routine business operations, there is limited time available for the creation and utilization of reflective Design Spaces (e.g., repositioning the design thinking space into a cloud-based virtual environment) (Lim, Kim, Kim, & Kim, 2019), it can be argued that the willingness to engage with an approach likely unfamiliar to the entrepreneur and misaligned with conventional business thinking will be limited (Moultrie, Clarkson, & Probert, 2006).

To ensure the successful implementation of Design Thinking within SMEs, specific success factors tailored to SMEs are required. Time resources and budgetary allocations are key for effective innovation implementation (Acklin, 2013). However, the prerequisites for SMEs in this regard diverge from those of larger enterprises. Large corporations often maintain dedicated research and development departments (inclusive of creative spaces), along with innovation managers or Design Thinking experts. Consequently, they possess the necessary infrastructure and personnel to evaluate new approaches like Design Thinking (Acklin, 2013).

Conversely, in SMEs, employees typically engage in such endeavors alongside their routine work responsibilities, and there are fewer specialized departments with designated experts. Additionally, SMEs typically exhibit caution when considering the implementation of innovative strategies such as Design Thinking, requiring a clear understanding of the anticipated benefits beforehand (Acklin, 2013). In contrast, large corporations are generally more inclined to allocate resources and space to pursue optimization and innovation.

### 3. Systematic Literature Review: Innovation Strategy Design Thinking in SMEs

#### 3.1. Research Design

This study is underpinned by a systematic literature review, a methodology that differs from traditional reviews in its pursuit of synthesizing research through a methodical, transparent, and iterative process (Crossan & Apaydin, 2010). The fundamental principles of systematic reviews encompass transparency, focus, equity, accessibility, concreteness, homogeneity across research and practice communities, and the ultimate achievement of synthesis. In essence, systematic reviews offer a clear and organized approach to managing research knowledge, serving as a manifesto for both the scientific and practical domains (Crossan & Apaydin, 2010).

The primary objective of this systematic review is to structure the realm of research pertaining to Design Thinking and its application within the context of SMEs. This endeavor aims to identify the researched topics, enumerate the most notable research gaps, and, consequently, contribute to the development of theory in this domain.

A systematic review entails a dual-pronged approach encompassing quantitative, bibliographic analysis and more qualitative, thematic analysis (Saur-Amaral, Reis Soares, & Proenca, 2018). Although systematic reviews can encompass various types of publications, we have adhered to the precedent set by fellow researchers by focusing exclusively on peer-reviewed academic journal articles in the English language. This selective approach ensures the quality of the included studies while also maintaining a manageable sample size.

Regarding the temporal scope of our review, we contend that Design Thinking has garnered substantial attention and witnessed pronounced interest from practitioners and international researchers in the last two decades. Therefore, our review encompasses academic papers published from 1998 to 2021, encapsulating the substantial developments in this field during this period.

#### 3.2. Data Collection

To pinpoint the pertinent literature on innovation related to Design Thinking within SMEs, a systematic literature review was carried out. The initial step involved delineating the search terms and keywords. We exclusively considered literature published in the English language to maintain consistency and ease of analysis. Moreover, to uphold the quality of the included literature, we exclusively focused on journals indexed in ISI/WoS.

On April 4, 2021, we conducted a comprehensive search of the extensive Web of Science database spanning the publication years from 1998 to 2021. Search queries within the Web of Science database were initially crafted, and subsequent hit lists were refined and extended as necessary (refer to Table 1).

Table 1 - Preliminary search terms for the systematic literature review

	Search term	Results	Purpose	Criticism
Surface search	“Innov*” (Current Contents Connect)	169,307	Edition of all works that contain a combination of words all about "innovation", "innovate", "innovative" etc. included	Too many hits, not very specific, usually wrong context
	“Innov*” AND “SME*” (Current Contents Connect)	2,804	Restriction of the works from the first query to those containing the term "SME*"	Too general, context continues to vary greatly
	“Design Thinking” (Current Contents Connect)	602	Overview of the hits on the topic Design thinking in general	Consolidation of the topic of Design Thinking without direct reference to the topic of innovation
Advanced search	“Design Thinking” AND “Innov*” (Current Contents Connect)	308	Specification of the previously made request. Limitations to works that are explicit engage in Design Thinking in the field of innovation management.	Strongly limited search space
	“Design Thinking” AND “Innov*” – related to specific research areas	70	Sample of selected articles to analyse and import to NVivo	Very Strongly limited search space, for importing it to NVivo

Source: Own elaboration

This preliminary step aimed to provide an initial assessment of the volume of available literature. Central works within the designated subject area and specific journals, equipped with comprehensive table of contents and bibliographic information, were employed as reference points. As a result, the effectiveness of the search terms was evaluated following a cursory examination of the results. Subsequent refinement of the search queries was undertaken to further narrow down the scope of results, as the initial outcome remained excessively broad. Ultimately, the investigation was restricted to the results derived from the combination of the terms "Design Thinking" and "Innov\*" and 308 distinct articles remained. The final search query incorporated the exact word sequences "Design Thinking" AND "Innov\*" in Title (see Table 1).

*Table 2 - Exact search term for the systematic literature review*

Database	Exact search term	Number of articles
Web of Science – Current Contents Connect	“Design Thinking” AND “Innov*” in Topic	308

*Source: Own elaboration*

To manage this body of literature, all 308 entries were exported to Endnote and a list of abstracts was created. Each paper underwent a scrutiny of its title and abstract for content relevance specifically related to Design Thinking and innovation. The following exclusion criteria were applied:

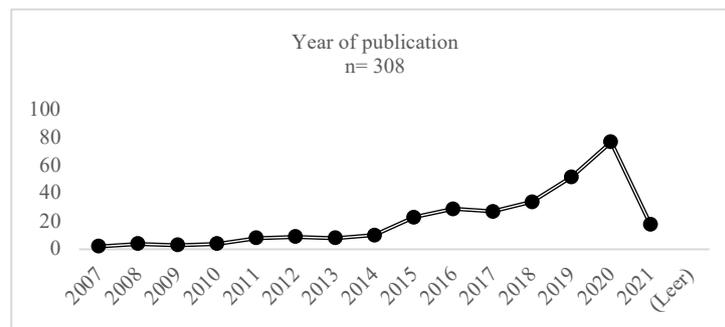
- Contributions that primarily considered Design as human-centered problem-solving.
- Those that predominantly focused on the specific design of objects, methods, or products.
- Works predominantly situated within Design Science, encompassing the advancement of specific methods or exploring the mindset of designers, without direct application to Design Methods for innovation.
- Entries that broadly and indiscriminately employed the term "Design Thinking," especially in the context of SMEs.
- Entries that did not align with these criteria were systematically excluded.

This rigorous screening process yielded a final sample of 70 literature entries, which were included in the subsequent analysis in NVivo 10.

During the manual content analysis of the abstracts, apart from identifying potential sources of knowledge, specific content pertinent to SMEs was extracted. Additionally, we singled out barriers or failures in the realm of innovation as a valuable tool for analysis through the lens of failures. As a result, we obtained a synthetic perspective over the topic, based on the 70 papers, that allowed us to integrate the findings and discern differences, commonalities, and factors contributing to innovation failures, shedding light on the related research landscape.

### 3.3 Descriptive Data Analysis

A descriptive analysis of the 308 articles in question unveiled that the first article linking Design Thinking and innovation within the sample emerged in 2007 (as depicted in Figure 1). Notably, starting from 2008, a discernible upswing in the number of articles becomes evident. This surge can be attributed, at least in part, to the Special Issue of the Harvard Business Review in 2008, featuring the highly-cited (1,060 citations) article "Design Thinking: Thinking like a designer can transform the way you develop products, services, processes - and even strategy" authored by IDEO CEO Tim Brown. This publication significantly amplified interest in the subject matter (Brown, 2008). Notably, the year 2020 marked the highpoint with a remarkable 77 contributions.



*Figure 1 - Publications per year*

*Source: Own elaboration*

Figure 2 considers the 152 most frequently occurring journals. The journal with more publications is Design Journal, by far a regular in the publications associated to design thinking and innovation, followed by International Journal of Engineering Education, Creativity and Innovation Management, Journal of Cleaner Production and Sustainability.

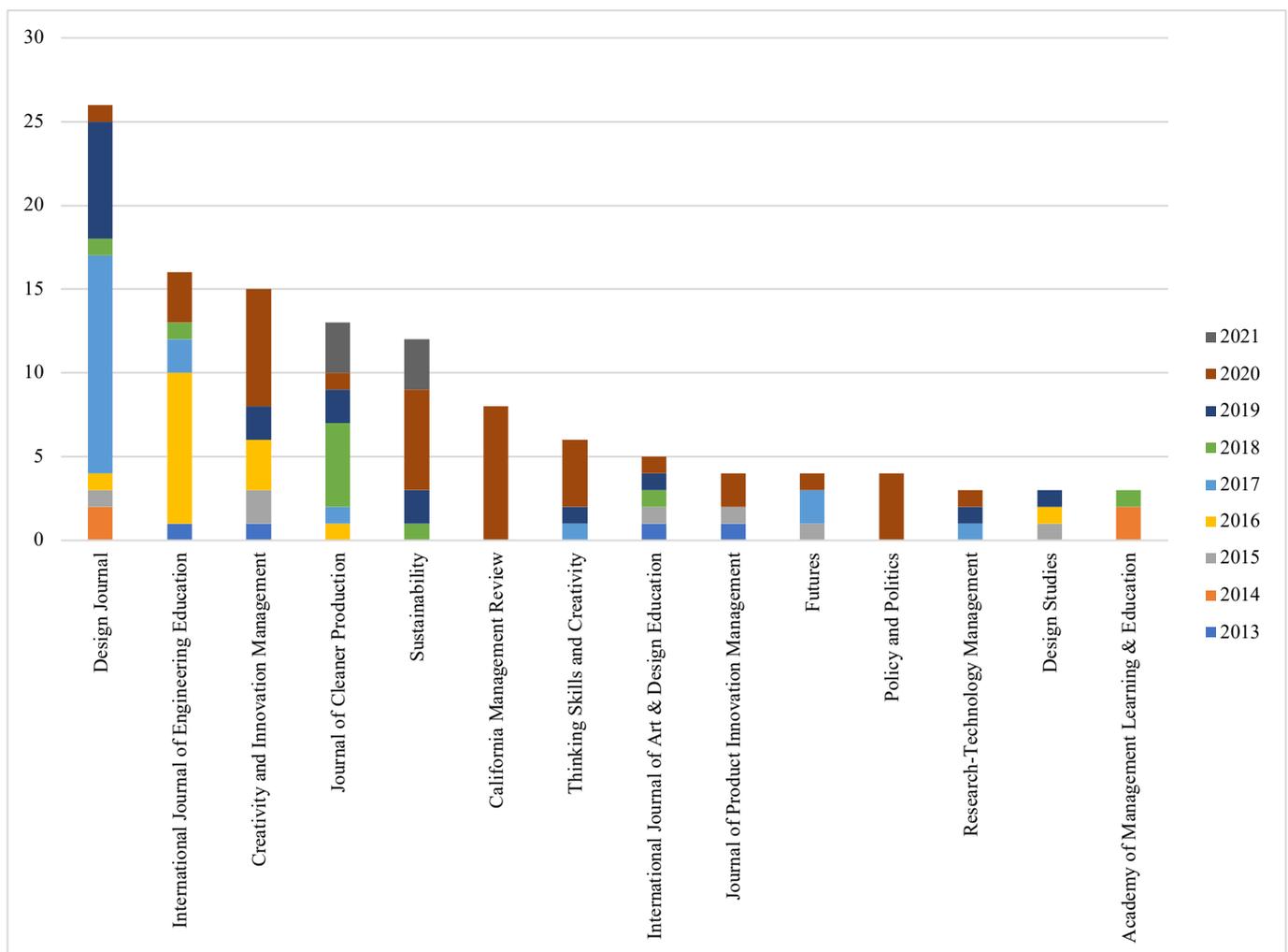


Figure 2 - Most important journals

Source: Own elaboration

### 3.4 Content Analysis

The content analysis was entailed on 70 articles, which directly related to Design Thinking and innovation. The process included thematic coding to determine the main attributes of Design Thinking, looking in detail at the SMEs and resulted in the development of a framework / set of relevant categories regarding the requirements, success factors and failures in implementing Design Thinking in SMEs.

Two distinct groups emerged: one centered on the failure of Design Thinking interventions, encompassing direct and indirect shortcomings in the articles (e.g., lack of understanding, inflexibility), and the other highlighting factors associated with notable successes (e.g., management support, customer-centric).

Furthermore, the analysis factors were tailored to SME characteristics, taking into account six SME-specific traits:

- *Entrepreneurial Dependence*: SMEs often rely heavily on the entrepreneur or entrepreneurial family for management and leadership (Kammerlander, Burger, Fust, & Fueglistaller, 2015).
- *Operational Focus*: In SMEs, managing directors frequently engage in operational activities, limiting their capacity for strategic management (Gasda & Fueglistaller, 2015).
- *Skilled Workforce*: Many SME employees receive in-house training, and both entrepreneurs and employees are deeply involved in day-to-day tasks, posing challenges to innovation (Liedtka & Ogilvie, 2011).
- *Agility Challenges*: SMEs may struggle to maintain the agility required for rapidly changing technologies and short product lifecycles (Saroghi, Sunny, Hornsby, & Fernhaber, 2019).

- *Financial Constraints*: SMEs often have more limited financial resources compared to larger corporations, particularly for investment projects (Kammerlander, Burger, Fust, & Fueglistaller, 2015).
- *Lean Structure*: SMEs typically have a lean organizational structure, with low formalization and a flat hierarchy (Durst & Edvardsson, 2012).

Drawing from these SME characteristics, the criteria for Design Thinking in SMEs were applied. Within the context of this study, the identified requirements from the literature were categorized as "Mandatory" (Table 3) and "Nice To Have" (Table 4). "Mandatory" requirements may pose greater challenges for implementation in SMEs compared to larger companies.

*Table 3 - Specific Requirements for Design Thinking in SMEs: Mandatory*

Mandatory	Explanation	References
Management support for the DT team	In the context of SMEs, the likelihood of introducing Design Thinking within a single department without the involvement and endorsement of the entrepreneur is significantly diminished. The commitment and support of the entrepreneur are imperative prerequisites for the successful execution of such projects.	(Appleyard et al., 2020; Bason & Austin, 2019; Crites & Rye, 2020; Eppler & Kernbach, 2016; Lee & Ma, 2020; Snyder et al., 2018; Vagal et al., 2020)
Time Resources	In SMEs, employee involvement in the innovation process is typically an auxiliary endeavor at best. These businesses often have fewer specialized departments. SMEs must exercise caution when contemplating the initiation of a Design Thinking project, especially when the precise benefits cannot be reliably quantified in advance.	(Agogino et al., 2016; Ahn et al., 2021; Beltagui, 2018) (Bicen & Johnson, 2015; Cagnin, 2018; Carlgren et al., 2014; Coco et al., 2020; Crites & Rye, 2020; de Carvalho et al., 2021; Ghajargar et al., 2017; Kimbell, 2011; Nagaraj et al., 2020; Yu et al., 2015)
Budget for design thinking projects	Here the statement for Budget is the same as in "time resources"	(Baldassarre et al., 2020)

*Table 4 - Specific Requirements for Design Thinking in SMEs: Nice To Have*

Preferable	Explanation	References
Small projects and small teams	In SMEs, the implementation of innovations differs significantly from large corporations. In these smaller enterprises, even modest projects can yield substantial successes.	(Baldassarre et al., 2020; Manzini & Rizzo, 2011)
DT team strategically well positioned (team selection)	SMEs often face challenges in allocating the required resources and space for pursuing optimization and innovation efforts.	(Beckman & Barry, 2007; Brown, 2008; Fleury et al., 2016; Hölzle & Rhinow, 2019; Kurtmollaiev et al., 2018; Nagaraj et al., 2020; Seidel & Fixson, 2013; Vagal et al., 2020; Yang & Hsu, 2020; Yeoman & Carvalho, 2019)
Strategic alignment with customer-centric or benefit-oriented approaches firmly established	SMEs tend to exercise caution when considering the initiation of a Design Thinking project, as they often require a clear understanding of the anticipated benefits before committing to such endeavors.	(Diepenmaat et al., 2020; Hankammer et al., 2019; Hölzle & Rhinow, 2019; Knight et al., 2020; Vetterli et al., 2016; Yan, 2018)

Success factors have been separated in "Specific to SME" (Table 5) and "General factors" (Table 6), in order to distinguish those factors which are dependent on company type and those which are not.

Failures that are not acknowledged and shared lose their significance in the realm of innovation. Consequently, organizations waste significant time, money, and resources by repeatedly making the same mistakes, all because these failures are not openly discussed. Entrepreneurs and managers show a growing interest in understanding the failures of innovation projects as a means of preventing potential issues and risks.

Table 7 illustrates the failures extracted from the articles, encompassing both direct and indirect contexts. Given the limitations and resource constraints often encountered by SMEs when implementing innovation projects, it is advisable for them to proceed with caution by taking smaller, more manageable steps in their projects.

*Table 5 - Success factors unique for SMEs*

Unique for SMEs	Explanation	References
Potential benefits of DT project known in advance	Only if it can be seen early on that the initial investment has paid off will others follow.	(Carlgren et al., 2014)
Design thinking steps well defined	SMEs lack the financial resources to take bigger risks. Therefore, the steps for innovation should be taken in smaller but safe steps.	(Bairaktarova et al., 2016; Carmel-Gilfilen & Portillo, 2016; Hookway et al., 2019; Pluchinotta et al., 2019; Shafiee et al., 2021)
External design thinking experts to support the project	Given the substantial involvement of employees in daily operations, it is often impractical for SMEs to allocate the time, resources, and expertise needed for internal design thinking implementation without the assistance of external coaches.	(Ghajargar et al., 2017; Jun et al., 2014; Kozłowski et al., 2018; Kulick, 2017; Na et al., 2017; Shapira et al., 2017)
Design Thinking success is measured differently	Small steps lead to greater success.	(Brassett & O'Reilly, 2015; Chandler & Ward, 2019; Conforto et al., 2016; Knight et al., 2019)
Cross-departmental projects with DT	Due to the flat hierarchical structures in SMEs, communication within teams tends to be more rapid compared to larger organizations.	(Seidel & Fixson, 2013)
DT is also integrated and applied to existing projects	In SMEs, innovation approaches are frequently applied in projects without explicit definition or recognition as formal innovation strategies.	(Liem & Brangier, 2012; Shafiee et al., 2021)
First application to design affinity areas	The advantage for SMEs is that DT can be introduced even with a small budget.	(Agogino et al., 2016; Beckman & Barry, 2007; Chandler & Ward, 2019; Lande, 2016; Lim et al., 2019)
External experts are involved	Outsourcing allows employees to focus on their own day-to-day work.	(Buhl et al., 2019; Carlgren et al., 2016; Eppler & Kernbach, 2016; Fleury et al., 2016; Glen et al., 2014; Kim & Strimel, 2020; Liem & Brangier, 2012; Olsen, 2015; Yu et al., 2015)

*Table 6 – General success factors independent of being SMEs*

Mandatory	Explanation	References
DT is visually represented and communicated	Visual representation of DT is possible in both SMEs and large enterprises.	(Na et al., 2017)
DT involved persons are professionally trained	The engagement of professional coaches can be beneficial for enterprises of all sizes. However, this factor holds greater significance and tends to be more effective in SMEs.	(Na et al., 2017; Shapira et al., 2017)
Physical space for DT projects is available	This area appeals more to large companies than to SMEs.	(McGann et al., 2018; McGann et al., 2021)
DT is easy to learn and use for company employees	Design Thinking remains practical and straightforward when adhering to its core steps, making it a feasible approach in companies of all sizes.	(Souza et al., 2020)
Internal employees involved in the project. Usually, no external experts necessary.	Large companies often have dedicated innovation departments, which can lead to limited external perspectives and involvement.	(Brown, 2008; Carlgren et al., 2014; Roberts & Palmer, 2012; Snyder et al., 2018)

*Table 7 - Failure factors based on the nature of SMEs*

Failure factors	Explanation (based on the nature of the SMEs)	Literature
Lack of customer input in customer analysis (customer goals, personas, customer journeys, etc.) and prevalent misconceptions of already knowing customer needs and expectations	Comprehending customer goals and the present customer experience as perceived by the customer is key to actively improve customer experience. Companies should acquire a deep understanding of the customer's objectives, requirements, viewpoints, and interactions in order to enhance their offerings effectively.	(Dhaliwa, Hussain, & Asif, 2019; Liu & Lu, 2020; Rau, Zbiek, & Jonas, 2017; Sohaib, Solanki, Snyder, Ingelsson, & Backstrom, 2018)
No comprehensive or incorrect survey of actual customer needs and expectations	A holistic and correct recording of the customer's needs and expectations require comprehensive ethnographic, qualitative and quantitative data collection and evaluation of internal and external information sources. Personal points of contact should be used for in-depth insights and feedback.	(Hankammer, Brenk, Fabry, Nordemann, & Piller, 2019)
Qualitative survey methods with the customer (surveys, interviews, etc.) are designed to create negative customer experiences	The process of directly collecting customer input should be utilized judiciously to prevent negative customer reactions and survey fatigue, which can diminish their willingness to provide valuable feedback.	(Andreassan, Kristensson, Lervik-Olsen, Parasuraman, McColl-Kennedy, & Edvardsson, 2016; Lim, Kim, Kim, & Kim, 2019; Pande & Bharathi, 2020)
No complete coverage of all touch points and no Evaluation of the importance of individual touchpoints from the customer's point of view	All touchpoints must be captured, and an assessment of relevance made from the customer's perspective.	(Hankammer, Brenk, Fabry, Nordemann, & Piller, 2019)
No linkage of the assessment of relevant touch points with entrepreneurial significance	The touchpoints deemed relevant by customers must also be assessed in terms of their economic significance for the company so that design priorities can be defined later.	(Martin, 2011)
Insufficient analysis (resulting in a lack of understanding) of the value-adding processes	Understanding how the company create value for the customers is key to effectively align the processes and value proposition with customer needs and expectations.	(Appleyard, Enders, & Velazquez, 2020; Holze & Rhinow, 2019)
No identification of relevant stakeholders and decision makers as well as their holistic customer journeys, goals and pain points	To create optimal experiences for all relevant customer stakeholder groups, it is key to capture the individual goals, pain points, and customer journeys from start to finish.	(Bas & Guillo, 2015; Geldermann, Lerche, & Sepulveda, 2018; Magistretti, Dell'Era, & Doppio, 2020; Pluchinotta, Kazakci, Giordano, & Tsoukias, 2019)
Insufficient analysis of a customer's interactions with other service providers in the ecosystem or other customers	A holistic understanding of the customer experience requires capturing the entire value-creating ecosystem. Companies should conduct a thorough analysis of this ecosystem to comprehend how it generates added value and utility for customers. Moreover, they should understand how this ecosystem shapes customer expectations and perceptions.	(Sorice & Donlan, 2015)
No adequate recording of own value-adding processes or current value proposition to customers	A common understanding of the existing value proposition and internal processes serves as the foundation for subsequent design choices and for aligning processes to deliver valuable experiences to customers.	(Hankammer, Brenk, Fabry, Nordemann, & Piller, 2019; Hirano, Ishizuka, & Sakaguchi, 2013)
No situation analysis of the competencies and resources currently available in the company, related to customer experience and organizational performance	The subsequent execution, monitoring, and control of customer experiences demand dedicated competencies and resources. It's only through analysis that any identified gaps can be addressed.	(Nagaraj, Berente, Lyytinen, & Gaskin, 2020)

## 4. Findings & Discussion

The findings from our analysis indicate that research on design thinking in the context of innovation is still a relatively young field, with steady development over the 15 years leading up to the study.

Notably, the most significant articles in the realm of design thinking research and innovation often had a strong design-oriented focus, with publications in journals like the *Design Journal* playing a predominant role. Furthermore, there were contributions in well-established innovation journals such as the *International Journal of Engineering Education*, *Creativity and Innovation Management*, *Journal of Cleaner Production*, *Sustainability*, and *California Management Review*. This diversification suggests that design thinking has garnered interest from various research streams.

Following our content analysis, we were able to pinpoint key elements and dimensions of design thinking practices within the SME context. These encompassed a focus on requirements, key success factors, and failures (as detailed in Tables 3 to 7). These objective elements for evaluating the effectiveness and shortcomings of design thinking and innovation methodologies can be employed to enhance innovation capabilities.

Our results underscore that, although there are some studies centered on the implementation of design thinking approaches in SMEs, there is still ample terrain to explore. The concept of design thinking is not widespread in SMEs (Gasda & Fueglistaller, 2015), partly because they are absorbed in day-to-day operations, making them slow to adopt new approaches (Magistretti, Dell'Era, & Doppio, 2020). This situation may pose a risk to their competitive advantages in the medium to long term.

Furthermore, as SMEs are not frequent users of Design Thinking, the academia has manifested a relevant interest in the topic (Kammerlander, Burger, Fust, & Fueglistaller, 2015), leading to insufficient academic knowledge about the phenomenon.

Nevertheless, SMEs exhibit certain characteristics that make them receptive to design thinking principles. Their openness to integrating design thinking practices is often greater than that of larger corporations (Shapira, Ketchie, & Nehe, 2017). Additionally, due to their flat organizational hierarchies, SMEs are capable of swiftly adapting to changes—a trait not as readily observed in large companies.

Consequently, these factors provide opportunities to further enhance and support the strategic sustainability behavior of SMEs and align them with the innovation objectives that Design Thinking pursues, in line with what is defended by Magistretti, Dell'Era, & Doppio (2020).

## 5. Conclusions

The primary objective of this study was to identify the scholarly output related to Design Thinking innovation strategy in SMEs context, and identifying requirements, success factors and barriers (associated to failures in implementation) through a systematic literature review. In doing so, we have made several contributions to the existing literature.

First, we have identified that innovation approaches, at their core, incorporate distinct Design Thinking parameters. These parameters revolve around managing uncertainty, fostering adaptability, flexibility, understanding, speed, and integration. Recognizing these interconnections between Design Thinking and innovation strategies can empower SMEs to enhance their response to uncertainty and mitigate risks.

Second, by developing the categorized Design Thinking framework, we provided scholars and practitioners a conceptual tool to put together innovative solutions and compare them against varying requirements and success factors within the context of SMEs. This paves the way for hybrid methodologies that offer multiple avenues for addressing uncertainty and other challenges.

It is worth considering that this study has limitations. While we have compiled a list of requirements, key success factors, and failures tailored to SMEs based on the literature, these elements have not been empirically tested. Future research could benefit from empirical validation.

Also, as a systematic literature review, the findings cannot be universally applied or provide managerial or policy recommendations.

Finally, as SMEs encompass a wide spectrum of firms, ranging from startups to well-established entities, their specific requirements, success factors, and failures can vary significantly. Future studies should consider examining these elements while controlling for variables such as size, age, industry, and other characteristics that may contribute to differences among SMEs.

Moving forward, researchers could explore the design principles found in the innovation management literature in relation to SMEs, developing a similar list tailored to these firms. Additionally, investigating the implementation of Design Thinking projects in the context of SMEs through empirical methods, such as expert interviews or multiple case studies, could yield a deeper understanding of the phenomenon.

Ultimately, researchers and scientists can further test, refine, and enhance the Design Thinking solution approaches introduced in this study across various business scenarios, including small and medium-sized enterprises and startups. They can also experiment with applying these Design Thinking criteria and principles at different stages of the Design Thinking process, employing diverse practices and techniques, and studying their influence on innovation performance.

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