Industries, frameworks, and key drivers of lean startup: a systematic literature review

Sectores, marcos de trabajo y factores clave del lean startup: una revisión sistemática de la literatura

Alejandro Gamón-Sanz *
Instituto de Biomecánica (IBV), Universitat Politècnica de València, Valencia, Spain.
alejandro.gamon@ibv.org

Joaquín Alegre
Departamento de Dirección de Empresas 'Juan José Renau Piqueras', Universitat de València, Valencia, Spain.
joaquin.alegre@uv.es • https://orcid.org/0000-0003-2723-6593

Ricardo Chiva
Departamento de Administración de Empresas y Márqueting, Universitat Jaume I, Castellón, Spain.
rchiva@uji.es • https://orcid.org/0000-0001-9525-8220

• Article received:
27 July, 2023

• Article accepted:
26 February, 2024

• Published online in articles in advance:
29 April, 2024

* Corresponding Author
Alejandro Gamón-Sanz

DOI:
https://doi.org/10.18845/te.v18i2.7137

Abstract: Lean Startup provides an iterative, hypothesis-driven approach to business creation and product development, promoting data-driven decision-making by involving potential users and customers during the development cycle. Despite increased academic attention, the debate on the benefits of Lean Startup is open. To contribute to the understanding of how organisations incorporate Lean Startup principles, this study conducts a systematic literature review and identifies the industries in which its application has been analysed, the adaptation models followed by organisations, and the key drivers for its adoption in new and established organisations. The study's findings contribute to advancing knowledge on the adoption of Lean Startup principles, tools, and techniques in organisations. The results also help to the academic debate surrounding the usefulness and application of Lean Startup principles across different organisational contexts.

Keywords: Lean Startup; innovation; product development; systematic literature review; continuous experimentation.

Resumen: El Lean Startup proporciona un enfoque iterativo y basado en hipótesis para la creación de negocios y el desarrollo de productos, promoviendo la toma de decisiones basada en datos al involucrar a los potenciales usuarios y clientes desde el principio. A pesar del creciente interés académico, la discusión sobre la utilidad y los beneficios del Lean Startup continúa. Con el objetivo de contribuir a la comprensión de cómo las organizaciones incorporan los principios del Lean Startup, se realiza una revisión sistemática de la literatura para identificar los sectores en los que se ha analizado su aplicación, los modelos de adaptación seguidos por las organizaciones, y los factores clave para su adopción en organizaciones establecidas. Estos hallazgos contribuyen a avanzar en el conocimiento sobre la adopción de los principios, herramientas y técnicas del Lean Startup en las organizaciones, y facilitan el progreso en el debate académico en torno a su utilidad y aplicación en diversos contextos organizacionales.

Palabras clave: Lean Startup; Innovación; Desarrollo de producto; Revisión sistemática de la literatura; Experimentación continua.

1. Introduction

In today's context of continuous technological disruptions, the emergence of new global competitors with differential value propositions and business models, not to mention constantly evolving consumer habits (Czinkota et al., 2021; European Commission, 2015), makes it necessary for organisations, both startup and established, to leverage innovation for long-term competitiveness, productivity, and sustainability (Dougherty & Hardy, 1996). In this sense, launching new products and services is of the essence (Cooper & Kleinschmidt, 2011; Di Benedetto, 1999).

However, the success rate of new products and services is very low (Hill et al., 2014; Salnikova et al., 2019; Simon-Kucher & Partners, 2014), leading to high risks, costs, and inefficiencies for organisations. Therefore, organisations require a process that helps identify consumer needs and problems to be solved, and determines the appropriate technology and business strategy solutions (Bohn & Kundisch, 2020).

To address this challenge, the Lean Startup approach (Ries, 2011) develops an iterative, hypothesis-driven method (Blank & Dorf, 2012) for business creation and product development. It involves engaging potential users and customers from the beginning, with minimal upfront planning, facilitating a shift from opinion-based to data-driven decision-making, while enabling adaptive design of products and services in an incremental manner (Bianchi et al., 2020). Lean Startup is based on the principles of Lean Manufacturing and Customer Development (Blank, 2020), and incorporates tools from other theories and methods, such as the Business Model Canvas and the Value Proposition Design approach (Osterwalder et al., 2014; Osterwalder & Pigneur, 2010), agile software development principles (Beck et al., 2001; Dybå & Dingsøyr, 2008), and Design Thinking (Brown, 2008). Thus, Lean Startup promotes the application of the scientific method to business development problem-solving, with validated learning through purposeful experimentation at the core of the methodology, focusing on value creation for customers and users (Ries, 2011, 2017).

Entrepreneurs, academics and organisations have widely applied the Lean Startup approach for its role in fostering innovation and the development of new products and services (Blank, 2013; Blank & Euchner, 2018; Moogk, 2012), gaining significant attention in recent years. Although the approach was initially conceived to support entrepreneurs in validating and innovating their business models through market testing and early customer feedback (Ghezzi & Cavallo, 2020), it is often applied in software-driven companies targeting B2C markets (Harms et al., 2015). Additionally, the approach has been successfully applied to other types of technologies (Sońta-Drączkowska & Mrożewski, 2020) and various contexts, including incubators and entrepreneurship programmes (Mansoori, 2017), food products (Lazo-Durand et al., 2021), retail (Solaimani et al., 2022), sports (Ranaweera et al., 2022) and education (Robb et al., 2020), among others. Furthermore, the application of Lean Startup is not limited to startups; it is also implemented in established organisations of different sizes (Bortolini et al., 2021; Furr & Dyer, 2014; Gaffney et al., 2014; Owens & Fernandez, 2014). Moreover, universities are incorporating Lean Startup principles into their academic curriculum (Youtie & Shapira, 2017).

While Lean Startup has received increasing attention from academia, the discussion regarding its usefulness and benefits in practice is ongoing (N. Bocken & Snihur, 2020). This lack of knowledge about implementation, as pointed out by Mansoori (2017), is reflected in criticisms such as those of Bieraugel (2015), who argues that Lean Startup was not originally designed to be incorporated into established organisations, or the lack of scientific evidence regarding its benefits in large organisations (Edison et al., 2015). On the other hand, authors like Popowska and Nalepa (2015) suggest that manufacturing companies may find it more challenging to follow the methodology due to their higher capital intensity and slower iteration cycles. In addition, Lean Startup might have limited applicability in certain product domains, such as healthcare or aerospace, because it might be too expensive and insecure (Racolţa-Paina & Andrieş, 2017).

Thus, the academic progress on Lean Startup is still in its early stages (Leatherbee & Katila, 2020), triggering discussions about its practical application by organisations (Bocken & Snihur, 2020; Felin et al., 2020). To further knowledge in this area, previous bibliographic analyses related to Lean Startup have been conducted with significant limitations in terms of quality of research materials used due to the topic's novelty. Bortolini et al. (2021) carried out a historical review of academic and professional literature, not only including peer-reviewed papers, but also sources as books, professional journals, and other literature. Silva et al. (2020) conducted a systematic literature review with a small number of references, including scientific articles and conference contributions, so not all publications related to Lean Startup were considered during the selection of works, and no criteria was established to consider its quality. York and York (2019) also used a limited number of references in their literature review, including scientific articles and other non-peer-reviewed documents such as student academic works, blog entries, business publications, or another web content. Finally, Lizarelli et al. (2022) used limited keywords during the literature search, and only in the publication title field of databases, including also conference contributions. Moreover, these contribution works are limited to a very specific aspect of Lean Startup application, as Bortolini et al. (2021) and York and York (2019) pointed out. Because the field is attracting more and more interest by researchers and is therefore evolving very quickly, further efforts are required to provide a comprehensive understanding of the conditions under which Lean Startup can be implemented with better outcomes.

To overcome that gap, we conducted a systematic literature review following the stages suggested by Tranfield et al. (2003) and the guidelines of PRISMA (Moher et al., 2009) to identify the sectors where Lean Startup application has been analysed, the adaptation models followed by organisations, and the key drivers for successful Lean Startup adoption in established organisations. Accordingly, the following Research Questions (RQ) are proposed in this study:

- RQ1. In which sectors is the application of Lean Startup analysed?
- RQ2. What frameworks do organisations follow to adopt Lean Startup principles?
- RQ3. What are the key drivers for successful Lean Startup adoption in established organisations?

By tackling these research questions, the study contributes to Lean Startup literature in several ways. First, we underscore that Lean Startup is being successfully adopted beyond the IT industry. Second, the frameworks used by organisations to adapt Lean Startup are classified to maximise the benefits of its application. Third, key drivers to be considered when implementing Lean Startup, such as Top Management Team commitment to change or scale up form small teams have been identified and explained.

2. Theoretical Framework

2.1 Products and services development models

Innovation is crucial for organisations' success in today's world and embodies companies' inclination to encourage and support new ideas, experimentation, and creative processes (Lumpkin & Dess, 1996). It is essential for gaining a competitive advantage in markets (Crossan & Apaydin, 2010) by enabling the identification of opportunities to create resources capable of generating economic value in an organised, intentional, and systematic manner (Drucker, 2006).

Thus, innovation is the process by which organisations transform ideas into new or improved products, services, or processes, aiming to progress, compete, and successfully differentiate themselves in their market (Baregheh et al., 2009). Managing innovation differs from managing operations, routine standardised processes, or defined and controlled projects because it involves high uncertainty (Bieraugel, 2015).

There are numerous products and services development models that incorporate varying stages, all starting with a concept and concluding with its commercialisation (Bessant & Tidd, 2015). Among them is the classic innovation funnel defined by Clark and Wheelwright (1992), consisting of three stages (idea generation, problem-solving, and implementation). In this model, product development begins with conceptualisation from a large pool of ideas that are analysed and refined before moving to implementation and commercialisation. Some companies adapt the original model to their needs by adding intermediate entry and exit options, resulting in most products and services development processes being linear and unidirectional, divided into several sequential stages. These models are effective in stable environments (Cooper & Kleinschmidt, 1996) but lack involvement of customers, users, or suppliers, and are not connected to market conditions before the actual product launch (Bayik, 2017). This implicitly assumes that the organisation already knows what the customer wants or needs.

In this regard, some of the most commonly used product development models in established companies are the Stage-Gate model (Cooper, 1990) or the waterfall model (Boehm, 1995), where the innovation development is structured into phases and organised linearly. The Stage-Gate model has been widely used in product development (Vliet, 2020), significantly influencing organisations' work methods over the past two decades (York & Danes, 2014). The original model consists of a five-stage or gate process, although its adaptation in organisations leads to processes with a greater or fewer number of stages, considering their internal organisation (Phillips et al., 1999). At the completion of each stage, validation according to certain criteria is required to progress to the next stage or discontinue the project, as each stage incurs higher costs than the preceding one, and the process is based on an increased commitment level in the product or service developed (Cooper, 1990).

On the other hand, the growing dynamism and uncertainty in many industries have led organisations to orient their products and services development models towards facilitating agility, flexibility, and customer orientation, diverging from highly structured approaches. These models prioritise communication and collaboration with the customer, continuously testing advancements to determine their usability and function (Rigby et al., 2016).

Therefore, organisations apply new approaches, as the agile software development (Beck et al., 2001), to facilitate rapid realignment of customer feedback, requirement interpretation, and error resolution through short, collaborative work cycles. This fosters continuous exchange of ideas, progress, and problem-solving among teams and stakeholders, all aimed at advancing toward a solution. Alternatively, Design Thinking principles (Brown, 2022) are also used, in order to promote innovation by identifying the most relevant challenges faced by a specific customer segment, and resolving them through products, services, or processes that enable superior value strategies, improving the definition process of innovative business models (Brown, 2008; Geissdoerfer et al., 2016). Even the Stage-Gate model has evolved to add spiral development, resembling an iterative process known as NextGen Stage-Gate (Cooper, 2008).

Lastly, aligned with these novel approaches, Lean Startup develops an iterative and hypothesis-driven method (Blank & Dorf, 2012) for business creation and product development. It involves potential customers from the beginning, with minimal upfront planning, allowing a shift from opinion-based to data-driven decision-making, while facilitating adaptive products and services design incrementally (Bianchi et al., 2020).

2.2 The Lean Startup approach

Lean Startup can be defined as the methodology oriented to build sustainable business models through continuous experiments and iteration (Ries, 2011), thus being an entrepreneurial mindset that aims to change the way businesses are developed and new products are launched (Nirwan & Dhewanto, 2015).

In this sense, Lean Startup is a framework for efficiently developing entrepreneurial ideas (J. M. York, 2018), with validated learning through purposeful experimentation at its core, emphasising flexibility and affordable loss to focus on activities that create value for potential customers (Frederiksen & Brem, 2017) through market testing and analysis customer feedback (Ghezzi & Cavallo, 2020). Also, the Lean Startup approach offers a framework for a trial-and-error process, providing an experimental methodology to resolve uncertainty in business (J. M. York, 2018) and minimise the risks of new business initiatives (Grossman, 2016). It is often referred to as a scientific method applied to startups (Picken, 2017), highlighting a disciplined process of exploration based on hypotheses about the functionalities of new products and business models, enabling the validation and refinement of the business concept as a first step in enterprise development (Aulet, 2013).

To develop the methodology conceptually, Ries (2011) drew inspiration from the principles of Lean Manufacturing (Ohno, 1988), which aim to avoid waste and optimise resource expenditure, and from Steve Blank's previous work in Customer Development (Blank, 2013; Blank & Euchner, 2018). As Mansoori et al., (2019) analyse, the ideas underlying the methodology also come from contributions in the field of disciplined entrepreneurship (Sull, 2004), the discovery-driven planning (McGrath & MacMillan, 2000), the process of testing and learning (Lynn et al., 1996), and the hypothesis-driven entrepreneurship (Eisenmann et al., 2012). These approaches emphasise early customer contact, reflective experimentation, and speed of learning. Moreover, the methodology incorporates elements from other theories and methods, such as the Business Model Canvas and the Value Proposition Design approach as tools for collecting hypotheses to validate (Osterwalder et al., 2014; Osterwalder & Pigneur, 2010), principles of agile software development (Beck et al., 2001; Dybå & Dingsøyr, 2008), and creative problem-solving from Design Thinking (Brown, 2008).

Therefore, as pointed out by Coviello and Tanev (2017), Lean Startup has popularised fundamental concepts from entrepreneurship theory, such as effectuation (Sarasvathy, 2001) and the entrepreneurship management (Stevenson & Jarillo, 2007), by making them more tangible and practical for practitioners.

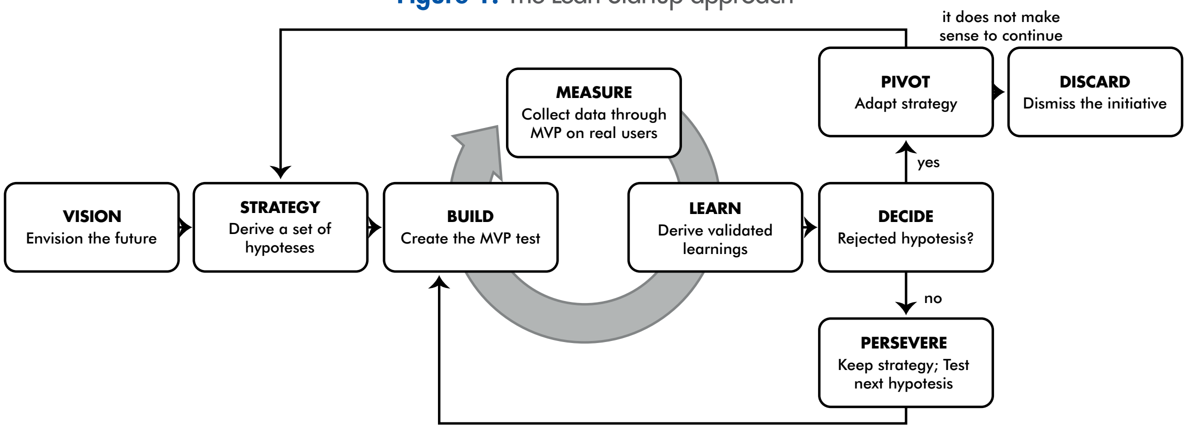
The Lean Startup approach follows small iterative learning cycles using Minimum Viable Products (MVPs) based on assumptions about what the market is willing to accept (Bohn & Kundisch, 2020). MVPs are not fully-featured versions of the ideal product but the simplest and cheapest version that can be quickly produced to rigorously validate specific product features or business model specifications with potential customers based on product or business model vision (Rasmussen & Tanev, 2015).

The validated Lean Startup learning cycle (Figure 1) is iterative and helps the entrepreneur assess whether to continue on the current path or if a change, known as pivoting, is necessary. According to Ries (2011), it starts with formulating an idea related to a problem and its possible solution. This idea is broken down into assumptions called hypotheses (Blank & Dorf, 2012) which are translated (BUILD) into a low-cost MVP. Within a controlled experiment, the MVP is used to validate the value proposition and associated business model elements. While it may not be possible to test the entire business model, each individual component can be tested and validated separately. Data and information are collected as the tests are carried out, which are then analysed and interpreted to draw conclusions (MEASURE). By reflecting on the results, in the third phase (LEARN), these are interpreted.

Once the learning cycle is completed, and if the hypotheses are considered true, a decision must be made: either develop the product if the iterations carried out are sufficient, or continue confirming the hypotheses proposed (persevere). If the hypotheses are not confirmed, new ways must be found to develop new hypotheses that fit the strategy (pivoting). These new hypotheses will be tested again in the next iteration, or the idea may be discarded if it does not make sense to continue despite the pivots made.

By systematising the innovation process and assessing the success or failure of a proposal, the Lean Startup approach creates a space for innovation in established organisations (Bieraugel, 2015) and influences the way companies manage these processes (Tanev, 2012). Lean Startup provides a strategy for entrepreneurs to achieve their vision for a business and obtain the best results (Ries, 2011) by minimising the risk of developing a product that the market is not willing to pay for, adjusting it to customer preferences with fewer resources. It significantly shortens the technological development cycle and the time from proposal conceptualisation to commercialisation, helping companies to define viable business models using minimal resources (Furr & Dyer, 2014).

Figure 1: The Lean Startup approach



Source: based on Bohn and Kundisch (2020).

The Lean Startup concept has attracted considerable attention, especially in entrepreneurial, professional and, to a lesser extent, academic circles (Frederiksen & Brem, 2017). However, despite its importance in the business world and its increasing presence in the academic literature (De Cock et al., 2020; Yang et al., 2019), Lean Startup still lacks evidence of its effectiveness according to some researchers (Mansoori et al., 2019).

2.3 Comparison between Lean Startup and other new products and services development models

The Lean Startup approach shares certain similarities with the Stage-Gate model by presenting innovation as a process that can be managed, and the NextGen Stage-Gate version also considers an iterative approach for product conceptualisation through iterations (DelVecchio et al., 2013), aligning with lean thinking (Cooper & Edgett, 2009). However, while the Stage-Gate model assumes a fit between the product and the market, proceeding through a refinement process where the decision at the end of each stage is to continue or terminate the project, in Lean Startup the onset is that the organisation is still searching for the business model and the alignment between the product and the market. Hence, the decision is to continue or pivot (Seggie et al., 2017). This perspective in Lean Startup can represent a complete change in strategy, whereas in the Stage-Gate model it is assumed that the correct strategy is defined before starting the process: if customer feedback suggests major redesigns, the product should not progress through its gates, at least in the traditional version of the process. Therefore, the Stage-Gate model is useful for eliminating work and swiftly creating a product, whereas Lean Startup accelerates the learning cycle (DelVecchio et al., 2013).

Besides, the Lean Startup approach benefits from agile software development principles (Dybå & Dingsøyr, 2008), with the major difference being that while Lean Startup associated practices are primarily outward-oriented, enhancing market and customer orientation as an endogenous factor in the development process of new products and services, agile practices are mainly inward-oriented, supporting planning flexibility in ongoing implementation activities. In this manner, agile is focused on incremental improvements of an existing product and predominantly refer to dimensions like time, cost, and quality (Sońta-Drączkowska & Mrożewski, 2020).

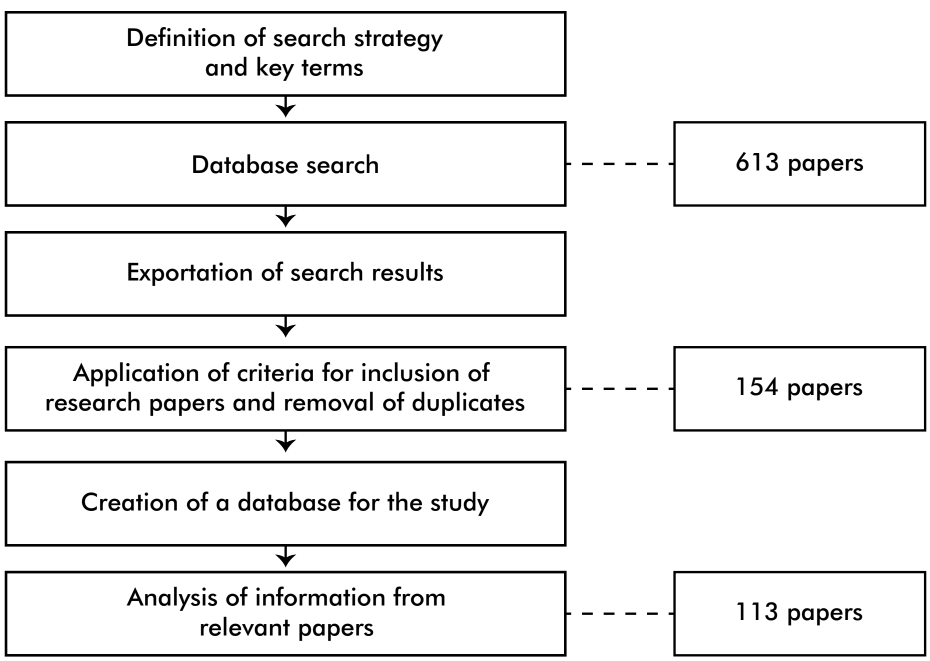
Finally, Design Thinking and Lean Startup address related issues and can contribute to increasing innovation process agility (Lichtenthaler, 2020b). Although they share a focus on customer needs, utilise creativity, rapid development and iterative experimentation, they differ in the stage of idea generation (Design Thinking includes idea generation, whereas Lean Startup generally begins from an existing idea), the role of business models (Design Thinking addresses problem-solving and solution optimisation in general, whereas Lean Startup heavily focuses on the business model and final implementation), and the use of quantitative data (Design Thinking concentrates on qualitative customer feedback, while Lean Startup emphasises the benefits of capturing and analysing quantitative data) (Baldassarre et al., 2017; Lichtenthaler, 2020b; Müller & Thoring, 2012).

3. Methodology

The methodology used in this study was a Systematic Literature Review (SLR). To ensure the reliability and validity of the findings, the study adopted the stages suggested by Tranfield et al. (2003) to have a rigorous framework for application. This framework included planning, which involves the identification of the research questions; conducting the review; searching for relevant literature; and analysing the literature through selection, extraction, and coding. The results were then reported and disseminated. Figure 2 describes the procedure followed and the results (number of papers) obtained in each phase, adapting the guidelines of the PRISMA statement (Moher et al., 2009).

The study included papers written in English published in academic journals, excluding book chapters, reviews, international conference proceedings, and grey literature, with complex inclusion and uncertain methodological quality (Hopewell et al., 2005).

Figure 2: Procedure followed during the Systematic Literature Review and results obtained in each phase.



3.1 Information collection

Search strategy and key terms

The first step in collecting information involved defining the key terms used in the search. To ensure a fit-for-purpose search string, the most relevant terms were chosen after an initial review of scientific papers on Lean Startup. The process of determining the search terms was iterative, starting with a simple search using the terms "lean AND startup" and "lean AND start-up". After analysing the results, the terms were refined. Finally, the terms used were: "lean", "startup", "MVP", "minimum viable product", "customer development", "pivot", and "business AND model AND innovation".

The range of terms used, all of which encompass the Lean Startup framework, ensured a low probability of excluding references of interest.

Search in databases

The bibliographic databases Web of Science, Scopus and ScienceDirect were used for the search, along with the search engine Google Scholar, which specialises in scientific-academic content and bibliography. These databases were chosen for their broad scope and quality (Falagas et al., 2008; Martín-Martín et al., 2018; Wang & Waltman, 2016), particularly Web of Science in the social sciences field (Crossan & Apaydin, 2010; West & Bogers, 2014). The use of multiple databases created some overlap in the results, but it ensured that relevant papers were included based on the search criteria.

Each database structures its contents and search functionalities differently; therefore, the search strategies were adapted in each case to ensure a broad range of references, avoiding the loss of those most relevant. The aim was to identify scientific papers published in peer-reviewed journals, which gives them quality and credibility, as the research work is assessed independently, subjectively and critically (Bedeian, 2004). This step was based on the assertion of Crossan and Apaydin (2010) and Podsakoff et al. (2005) that only publications in peer-reviewed journals can be considered validated knowledge with a significant impact on academic discourse.

The search string with the terms "lean AND startup" in title and abstract fields of papers was enough to cover the entire existing literature on the subject, since using other combinations described above produced overlaps in the results. The first search was conducted in January 2020, followed by two identical searches in August 2020 and August 2021 to incorporate new papers published during those periods. Table 1 presents the main search strategies used in each database and the results obtained in August 2021. In sum, 613 references were identified.

Table 1: Search strategies used in each database and results in August 2021.

Database	Search strategy	Results
Web of Science	(TS=(lean startup)) OR TI=(lean startup)	152
ScienceDirect	TITLE-ABS KEY (lean AND startup) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English"))	48
Scopus	Title, abstract, keywords (lean AND startup)	131
Google Scholar [1]	Results with *allintile lean startup*	282

1 *The search is less restrictive as it does not distinguish between types of documents. Therefore, the results include not only scientific papers but also contributions to conferences, books, or other academic papers not peer-review.*

3.2 Information extraction

Using the export tools provided by the search engines, the 613 results were transferred to a Microsoft Excel spreadsheet for analysis to build the database of publications. Metadata such as title, abstract, author(s), document type, journal of publication, year, and keywords were included. After removing the 287 duplicate search results, all remaining papers were downloaded for further review.

Criteria for inclusion of research papers

The next step consisted of selecting those papers that contained objective and relevant information contributing to the research objectives. The titles, keywords, and abstracts of papers were reviewed based on specific inclusion criteria:

- Language: full text in English.
- Topic: The study focuses on the application of Lean Startup principles within an organisational context. It may involve defining a specific framework tailored to a particular case, which could be supported by quantitative, qualitative, or mixed empirical studies. Alternatively, the paper may adopt a conceptual or theoretical perspective for developing the concept.
- Quality: each paper underwent a quality audit, which considered factors such as the clarity of the research question(s), the robustness of the methodology, sample size, theoretical framework, and the validity of the findings.
- Unit of analysis: papers with application of the Lean Startup approach in any type of organisation were included (large companies, SMEs, startups, universities, or governments).
- Type of documents: Only scientific papers published in peer-review journals were considered. Conference contributions, posters, book chapters, editorials, and other academic works were not included in this review.

Applying these criteria, the number of papers for in-depth analysis was reduced to 154.

3.3 Information analysis

The 154 papers were carefully and analytically read to identify and extract information based on predefined categories. After a thorough reading, 41 works were discarded, and 113 papers were selected as valid for the purpose of the research. A summary table containing information on the papers included in the SLR can be found in Appendix A.

4. Results and Discussion

4.1 Sectors and fields of application

Almost half of the total papers considered in the SLR, excluding theoretical and conceptual studies, are related to the application of Lean Startup in startups operating in new technology sectors (e.g. Ghezzi, 2019; Ghezzi & Cavallo, 2020; Humphreys, 2015; Miski, 2014; Popowska & Nalepa, 2015; Tohanean & Weiss, 2019; Xu & Koivumäki, 2019). This is not surprising considering the origin of Lean Startup in the software and new technologies industries (Edison, 2020).

However, given the unique characteristics of each business and market, Lean Startup can serve as a guiding framework (Popowska & Nalepa, 2015), prompting organisations to assess the most suitable way to apply this approach. As pointed out by Poppendieck and Poppendieck (2003), practices cannot be directly transposed from one discipline to another without interpretation and translation. Similarly, Harms et al. (2015) emphasise the need for significant customisation of the methodology when applied outside the software field, particularly in operational environments. This is because regardless of whether a proposal is suitable or far from the market, Lean Startup improves the likelihood of success (Ries, 2011) and provides organisations with a valuable tool for managing early-stage businesses (Blank, 2013).

Considering RQ1, 25 sectors and fields of application of Lean Startup principles beyond digital, ICT or new technology initiatives were identified. As listed in Table 2, these sectors and fields include startup accelerators, agriculture, automotive, libraries, biopharmaceutical, biotechnology, public research centers and universities, cinema, construction and energy efficiency, consultancy, local development, electric power distribution, consumer electronics, social entrepreneurship, education, tyre manufacturing, financial, governmental, industry 4.0, Living Labs, advanced materials, health, social work, tourism, and clothing retail.

Table 2: Sectors and fields of application of Lean Startup principles sorted alphabetically.

Sector or field of application	Authors
Advanced materials	Harms (2015)
Agriculture	Brecht, Hendriks, et al. (2021); Cavallo et al. (2019); Peralta, Echeveste, Martins, et al. (2020)
Automotive	Pillai et al. (2020)
Biopharmaceutical	Boni (2016)
Biotechnology	Silva et al. (2021)
Cinema	Gay (2014)
Clothing retail	Bocken et al. (2017); Weissbrod and Bocken (2017)
Construction and energy efficiency	Baldassarre et al. (2017)
Consultancy	Magistretti et al. (2019)
Consumer electronics	Hwang and Shin (2019)
Education	Armstrong (2017); Ávalos et al. (2019); Harms (2015); Kaylan et al. (2021); Nientied (2015); Qin et al. (2020); Reis et al. (2019); Robb et al. (2020); Schultz (2022); Shiradkar et al. (2021); Uansa-ard and Wannamakok (2020)
Electric power distribution	Leal et al. (2021)
Financial	Vliet (2020)
Governmental	Burgi et al. (2017)
Health	Johnson et al. (2016)
Industry 4.0	Baloutsos et al. (2020)
Libraries	Ahmad et al. (2020); Bieraugel (2015)
Living Labs	Schuurman and Protic (2018)
Local development	Khandros (2019)
Public research centres and universities	Still (2017)
Social entrepreneurship	Semcow and Morrison (2018)
Social work	Traube et al. (2017)
Startup accelerators	Ghorashi and Asghari (2019); Mansoori et al. (2019)
Tourism	Millán Vázquez de la Torre et al. (2019)
Tyre manufacturing	Ganguly and Euchner (2018)

4.2 Frameworks for adopting Lean Startup principles in organisations

Lean Startup principles must be adapted to the context and nature of each organisation and the sector in which they are applied, and several papers have defined specific adaptations and developed conceptual frameworks to enhance operational efficiency (Dahle et al., 2020).

Based on the frameworks described in the literature, it is proposed to classify them into three levels according to the degree of customisation to the organisation adopting Lean Startup principles (RQ2).

At the first level, there are general frameworks that explain how to integrate Lean Startup into any organisation, making explicit how to integrate or combine different tools, principles, and practices of Lean Startup, also considering approaches such as Customer Development, Lean Product, Lean Innovation, Machine Learning or big data. In this level are included the M-Lean framework (Nashaat et al., 2019), the Customer Value Measurement and Identification framework (Peralta, Echeveste, Lermen, et al., 2020), the Toolbox for Green Product Innovation (Buhl, 2018), and the model that combines the Lean Startup and big data developed by Seggie et al. (2017).

The second level includes frameworks aimed at integrating Lean Startup principles into specific functions of the organisation, such as marketing, through the Lean Commercialisation framework (Gbadegeshin, 2018), or mentoring activities by means of the Lean Mentorship framework (Aguiar et al., 2019). This level also includes frameworks focused on defining a sustainable value proposition (Baldassarre et al., 2017) and transitioning towards circular and sustainable business models (Bocken et al., 2018).

The third level corresponds to the adaptation of Lean Startup principles to specific sectors or types of organisations. These frameworks consider sector-specific aspects such as the operating environment, current innovation models' limitations, and sector-specific phases of innovation and product development. At this level are classified the Minimum Viable Accelerator framework (Ghorashi & Asghari, 2019) for startup accelerators; the Lean Accelerator Canvas (Iazzolino et al., 2020) for university spin-offs; the Innovation Acceleration Model (Still, 2017) for public research organisations and universities; the Lean Discovery Process (Carroll & Casselman, 2019) and the Smart Platform Experiment Cycle (Brecht, Niever, et al., 2021) for digital businesses; and the RIGHT model by Fagerholm et al. (2017) for software product development. Startup-specific frameworks also include the framework for generating a new startup concept (Reis et al., 2021), the B2B-Startup Experimentation Framework (Brecht, Hendriks, et al., 2021) for B2B environments, and the SMED4BMC model (Balocco et al., 2019) for digital initiatives.

Table 3 exhibits the 17 frameworks resulting from Lean Startup adaptations identified during the SLR. These frameworks are categorised according to the three levels of Lean Startup customisation described above.

4.3 Key drivers for successful Lean Startup adoption in established companies

The research has identified nine key drivers for the efficient adoption of Lean Startup principles in established companies (RQ3). These drivers are essential in facilitating successful implementation and enabling companies to foster innovation, adapt to market changes, and create sustainable competitive advantages in today's dynamic business environment. Key drivers are described below and summarised in Table 4.

Table 3: Lean Startup frameworks from the literature.

Title of the adaptation (framework)	Description	Author/s
Level 1. General frameworks that make explicit the integration or combination of Lean Startup tools, principles, and practices in any type of organisation.		
M-Lean	Guides companies in designing, developing, evaluating, and implementing B2B predictive systems using Machine Learning to maximise business value and eliminate inefficient development practices.	Nashaat et al. (2019)
Customer Value Measurement and Identification (CVMI)	Integrates Customer Development, Customer Value, Lean Product, Lean Startup and Lean Innovation, with a focus on understanding and meeting customer demands.	Peralta, Echeveste, Lermen, et al. (2020)
Model combining Lean Startup and big data	Provides an integrated process for learning innovation by combining Lean Startup principles with big data analysis.	Seggie et al. (2017)
Toolbox for Green Product Innovation	Aims to validate and refine green product innovation ideas, increasing the chances of bringing valuable proposals to market.	Buhl (2018)
Level 2. Frameworks for integrating Lean Startup principles into specific organisational functions.		
Lean Commercialisation	Combines Lean Startup principles with commercialisation knowledge to transform technology and knowledge into products and services efficiently, enabling quick validation of technologies and business for technology-based companies.	Gbadegeshin (2018)
Lean Mentorship	Organises mentoring activities in organisations promoting entrepreneurship, such as science and technology parks, universities, incubators, and accelerators, following the lean mentality.	Aguiar et al. (2019)
Model for defining a sustainable value proposition	Integrates the sustainable value proposition framework with an iterative user-driven process to develop comprehensive and dynamic value propositions.	Baldassarre et al. (2017)
Circular Business Experiment Cycle	Guides companies in transitioning to circular and sustainable business models through experimentation.	Bocken et al. (2018)
Level 3. Frameworks for adapting Lean Startup principles to specific sectors or types of organisations.		
Minimum Viable Accelerator (MVA)	Combines Lean Startup principles with the structural framework of startup accelerators to improve validated learning and reduce resource usage in new accelerator programmes.	Ghorashi and Asghari (2019)
Lean Accelerator Canvas	Addresses the growth challenges of university spin-offs by monitoring five risk areas (technological, market, implementation, governance and financial) and performance metrics.	Iazzolino et al. (2020)
Innovation Acceleration Model	Overcomes limitations of current innovation models in public research organisations and universities, focusing on four phases of discovery: customers, solutions, value propositions, and growth.	Still (2017)
Lean Discovery Process	Applies lean principles early in the development of digital business concepts, reducing uncertainty through market experimentation.	Carroll and Casselman (2019)
Smart Platform Experiment Cycle (SPEC)	Validates digital platform business models to increase success rates and mitigate the risk of developing unwanted or unprofitable products or services.	Brecht, Niever, et al. (2021)
RIGHT Model	Enables continuous experimentation in software product development by integrating requirements, design, implementation, testing, and maintenance phases.	Fagerholm et al. (2017)
Framework for generating a new startup concept	Supports startups in their early stages by combining Lean Startup, Business Model Canvas, and Design Thinking to achieve profitable and sustainable growth.	Reis et al. (2021)
B2B-Startup Experimentation Framework (B-SEF)	Guides startups operating in a B2B environment through Lean Startup principles, Growth Hacking, and Customer Development to validate and improve their business models effectively.	Brecht, Hendriks, et al. (2021)
SMED4BMC Model	Assists digital startups in navigating business model transformation through experimentation and validation, drawing parallels with the SMED lean production tool.	Balocco et al. (2019)

Table 4: Key drivers for successful Lean Startup adoption in established companies.

Key driver	Description	Author/s
Top Management Team commitment to change	Having the commitment of the Top Management Team is of utmost importance in supporting the implementation of Lean Startup. This entails providing the necessary resources, legitimising the initiative, empowering employees, and fostering a culture that inspires innovation.	Lindgren and Münch (2016); Seggie et al. (2017); Yaman et al. (2017)
Create aligned opportunity spaces with strategy	Create opportunity spaces aligned with the organisational strategy to foster innovation and value creation for both the organisation and customers. These spaces should have a clear process to support the advance of innovations.	Edison et al. (2018); Euchner (2019)
Identify the right profiles	Effective implementation of Lean Startup requires interdisciplinary teams composed of individuals with diverse backgrounds, experiences, and roles, capable of working in high-uncertainty contexts.	Edison et al. (2018); Euchner (2019); Leatherbee and Katila (2020); Magistretti et al. (2019)
Train profiles in Lean Startup principles	Teams need training to interact with customers, plan and conduct experiments, analyse results, work on new ideas outside their regular work, and gain confidence in applying Lean Startup principles. Additionally, teams require appropriate assets and tools for experimentation.	Fagerholm et al. (2017); Lindgren and Münch (2016); Weissbrod and Bocken (2017)
Reduce bureaucracy and allow autonomy to experiment and pivot	Empower teams with autonomy to experiment and deviate from certain organisational processes, rules, or policies, enabling a continuous mode of operation. However, efforts should be made to minimise organisational tensions.	Edison et al. (2018); Hwang and Shin (2019)
Motivate employees	Design an incentive structure that provides innovators a transparent career path allows them to share in the success of their innovations, and fosters a culture where taking risks does not result in severe consequences. This can be achieved through financial benefits or intrinsic motivators, such as new professional experiences.	Hwang and Shin (2019); Weissbrod and Bocken (2017); Yaman et al. (2017)
Scale up from small teams	Implement the continuous experimentation approach by starting with small-scale trials and gradually expanding them to the rest of the organisation. This approach facilitates the improvement of exploration-exploitation activities without causing abrupt changes within the organisation.	Magistretti et al. (2019)
Control the process	Establish innovation accounting and a controlled investment model, including feedback loops that facilitate the flow of relevant information from experiments to different parts of the organisation. This enables informed decision-making regarding new investments, pivoting, or discontinuation of ideas.	Euchner (2019); Fagerholm et al. (2017)
Prior knowledge of the market	Prior knowledge of the market is essential as it positively influences the ability to interpret and act on the information obtained during the validation process.	De Cock et al. (2020)

Top Management Team commitment to change

Strategic changes require support and commitment from the Top Management Team to ensure sustainability through funds and assets that enable their deployment and maintenance (Edison et al., 2015; Gaffney et al., 2014). Therefore, it is essential for organisations to be motivated and understand the needs, as time and effort are necessary for these change processes (Yaman et al., 2017). On the other hand, as pointed out by Edison (2020), Top Management Team support is fundamental for effective decision-making in managing business risks that fall outside the authority of the project team. It also helps maintain the legitimacy of the initiative through management support, which mobilises resources, empowers, and inspires innovation, ensuring the impact on the organisation. A positive organisational culture that values experimentation is a success factor in this regard (Lindgren & Münch, 2016).

It should also be noted that implementing any strategic change is complex, and there are several challenges involved, including coordinating change and adaptation, communication and comprehension, agility and ambition, pressure for short-term results, and competition for scarce resources within the organisation (Seggie et al., 2017).

Create aligned opportunity spaces with strategy

Euchner (2019) proposes the creation and clarification of opportunity spaces aligned with the strategy, which allow innovations to generate value for the organisation and customers. These spaces have a clear configuration of resources, products, and processes that support them.

On the other side, Edison et al. (2018) highlight the importance of involving the Top Management Team transparently throughout the process. This involvement ranges from presenting ideas and obtaining permission to work on them to reporting progress and requesting resources at all stages. It is very significant to convince the Top Management Team that the chosen idea will generate revenue without disrupting existing business or customer-supplier relationships.

Identify the right profiles

Effective implementation of experimentation requires interdisciplinary teams, made up of people with diverse backgrounds, disciplines, experiences, and roles (Magistretti et al., 2019). This configuration is necessary to enhance the decision-making process, foster collaboration, and reduce communication gaps, as pointed out by Edison et al. (2018), who also recommend that these profiles carry varying importance at different stages of hypothesis validation, development, and business growth. Additionally, these teams should possess specific assets and tools to facilitate interaction and collaboration (Magistretti et al., 2019).

The composition of the team plays a significant role in fully leveraging the benefits of Lean Startup (Leatherbee & Katila, 2020). However, not all professional profiles are suited for working in a startup mode. Certain individuals excel in stable contexts, while others thrive amidst high uncertainty. Moreover, some teams require a slower pace of progress to fully comprehend their work, which may be incompatible with Lean Startup principles (Edison et al., 2015). Therefore, it is decisive to identify the appropriate profiles within the organisation.

Dedication to Lean Startup activities within these teams can create internal tensions, particularly as the initiative expands. Euchner (2019) suggests that as long as the team's resource needs are constrained, they can operate somewhat unnoticed, gathering the necessary resources and permissions without significant challenges. However, when greater internal resources, larger budgets, or the development of non-embeddable business models arise, the involvement of the Top Management Team becomes necessary to avoid tensions within the organisation.

Train profiles in Lean Startup principles

Teams need comprehensive training to effectively implement Lean Startup principles. This includes interacting with customers to derive assumptions, planning experiments, and reporting results for decision-making (Fagerholm et al., 2017). They should also be encouraged to work on new ideas outside of their regular tasks (Gaffney et al., 2014), and develop confidence in working with Lean Startup principles and uncertainty (Weissbrod & Bocken, 2017). Moreover, equipping teams with the necessary tools and techniques for continuous experimentation is imperative (Lindgren & Münch, 2016).

Reduce bureaucracy and allow autonomy to experiment and pivot

Organisational structure defines how activities are controlled and coordinated to achieve organisational goals (Koberg et al., 1996). Established organisations rely heavily on bureaucracy, standardisation, and formalisation: bureaucracy encompasses institutionalised rules, policies, and routines dictating task performance, while standardisation governs employee interactions and decision-making processes. In addition, employees already hold specific formal jobs and responsibilities (Edison et al., 2018).

However, there are instances where it becomes necessary to remove bureaucratic barriers and depart from organisational rules to increase the speed of innovation. Teams using Lean Startup need a certain level of autonomy to foster learning and building MVPs at the required pace, avoiding excessive reliance on other teams to address specific challenges (Edison, 2020; Hwang & Shin, 2019) while mitigating internal organisational tensions.

Motivate employees

The formation of teams using Lean Startup principles, along with its motivation, is as important as identifying the right profiles (Weissbrod & Bocken, 2017). Equally significance is the design of an incentive structure that enables innovators to have a career path and participate in the success (Gaffney et al., 2014; Hwang & Shin, 2019), while specifying consequences if objectives are not achieved (Edison, 2020). These incentives need not be solely tied to financial benefits such as bonuses, salary increments, or shares. They can also be driven by intrinsic motivation, such as involvement in and learning from new professional experiences.

In the early stages of implementation of Lean Startup, it is important to begin with motivated teams that understand the importance of the new development approach and their role in the introduction process. This establishes them as experts for future experiments within the organisation (Yaman et al., 2017). Sustained motivation and timely execution of experiments are essential, as an extended duration can have a negative impact on motivation and persistence within organisations.

Scale up from small teams

Organisations often exhibit a cultural orientation toward traditional approaches and processes, and usually resist to new methods focusing on flexibility and agility (Magistretti et al., 2019). However, to improve the balance between exploration and exploitation activities, and successfully implement approaches such as Lean Startup, organisations must systematically evaluate and filter ideas, choosing the appropriate business processes – whether traditional or lean (Gaffney et al., 2014). The adoption of a new method should be considered on a project-by-project basis, encouraging its use when it can enhance results.

The transformation towards continuous experimentation, promoted by Lean Startup, should be gradually disseminated throughout the organisation. This can be achieved by conducting small-scale tests with small development teams (Olsson et al., 2012), that foster success, allowing for gradual expansion to the rest of the organisation. This paced and directed approach facilitates incremental change without imposing abrupt disruptions to the *status quo* that could hinder the initiative.

Control the process

Establishing a mechanism for measuring success using innovation accounting beyond standard company objectives is vital (Gaffney et al., 2014). This principle aligns with Lean Startup's emphasis on feedback loops suggested by Ries (2011), enabling the flow of relevant progress information to various parts of the organisation (Fagerholm et al., 2017). To this end, Euchner (2019) proposes a Stage-Gate process approach linked to Lean Startup activities, incorporating intermediate deliverables and realistic timelines.

This approach provides a clear sense of progress, facilitates investment decisions, and creates a space for continuous learning about market progress and potential product development. At this point, breakthroughs are explicitly discussed for each stage of the process, incorporating milestone-based funding while aligning pivot decisions with the necessity to demonstrate progress. In Lean Startup, pivots are evidence-based; however, within organisations, innovations are measured by milestones, not solely by acquired knowledge. Hence, making this learning visible becomes imperative.

Prior knowledge of the market

Integrating Lean Startup with the capacity to interpret and respond to gathered market data through user or customer experimentation is essential for its effective implementation (De Cock et al. 2020). This empowers organisations to learn from market insights, facilitating to make major changes to their business models or value propositions.

In this sense, prior market knowledge holds profound importance, as organisations lacking such knowledge embark on an unstructured trial-and-error learning process. Consequently, their experiments fail to yield convergence.

5. Conclusions and future research directions

This study has identified the sectors and fields in which Lean Startup is applied, beyond the software or digital industry where it originated (Edison, 2020) showing, both, theoretically and empirically, that the application of Lean Startup is not limited to these types of organisations. Fields of applications as agriculture, biotechnology, cinema, consultancy, education, financial, health or startup accelerators, among others, are some examples analysed where Lean Startup can be applied to enhance the organisation performance.

Additionally, the frameworks to adapt Lean Startup principles to maximise benefits are described and organised considering the degree of customisation to the organisation, ranging from general frameworks that make explicit the integration or combination of Lean Startup tools, principles, and practices to those tailored for integrating Lean Startup principles into specific organisational functions.

Finally, nine key drivers for established organisations to efficiently adopt Lean Startup principles and achieve optimal results are described. These are (1) Top Management Team commitment to change, (2) create aligned opportunity spaces with strategy (3) identify the right profiles, (4) train profiles in Lean Startup principles, (5) reduce bureaucracy and allow autonomy to experiment and pivot, (6) motivate employees, (7) scale up from small teams, (8) control the process, and (9) prior knowledge of the market.

These insights contribute to advancing knowledge regarding the adoption of Lean Startup principles, tools, and techniques, allowing organisations to apply them to their products and services development processes most effectively, with discernment and confidence. The conclusions presented through the SLR facilitate the gathering of numerous examples that demonstrate the utility of Lean Startup, and under what conditions, within organisations operating across diverse contexts. On the other hand, the described adaptation models serve as a basis for organisations, alongside the factors for driving a successful adoption.

Furthermore, findings deepen the current understanding in literature concerning Lean Startup, contributing to the academic discourse on its usefulness and application in organisations, offering avenues for improvement. This allows to move beyond the uncertainties about real-world implementation highlighted by authors such as Mansoori (2017) and Schuurman and Protic (2018), progressing towards a consensus regarding the utility and boundaries of its principles, thereby advancing the theoretical foundation of the approach. It also aids in defining future research directions beneficial for organisations. Eventually, our findings provide insights and evidence for the academic teaching of Lean Startup principles in formal entrepreneurship programmes at universities and business schools.

Like any research, this study has limitations, although efforts were made to minimise them by adopting the stages suggested by Tranfield et al. (2003) and following the guidelines of the PRISMA statement (Moher et al., 2009). However, the criteria for including research papers reduced the number of works considered in the SLR. Focusing solely on peer-reviewed journals ensures the information's quality (Crossan & Apaydin, 2010), yet it omits available knowledge from other sources like book chapters or conference contributions. Moreover, works written in languages other than English were excluded, leaving out a substantial body of academic work that could have contributed to the analysis. Lastly, there might be bias in the auditing process for the quality of each work included in the SLR, which was minimised by clearly establishing the acceptance criteria.

As potential directions for future research, we suggest conducting specific and comparative analyses of Lean Startup applications to identify common attributes among organisations in sectors where these principles are employed. This research could also explore different integration methods within organisations. For instance, organisations may opt for varying degrees of adaptation and customisation of Lean Startup principles based on the frameworks analysed in this study. This could involve hybrid organisations that integrate traditional and alternative processes (Magistretti et al., 2019), starting with the adoption of Lean Startup principles by a working group or internal division (Jurado & Olano, 2014; Magistretti et al., 2019), developing complete internal processes (Guinan & Parise, 2017; Power, 2014), or establishing independent dedicated entities within the organisation based on Lean Startup principles (Edison, 2020).

References

Aas, T. H., & Alaassar, A. (2018). The impact of visual performance management on decision-making in the entrepreneurial process. *International Journal of Innovation Management, 22*(05), 1840002. https://doi.org/10.1142/S1363919618400029

Aguiar, R. B. de, Silva, D. S., Caten, C. S. ten, & Silva, L. C. P. (2019). Lean mentorship: fitting external support to entrepreneur needs over the startup development. *Production, 29*, e20190078. https://doi.org/10.1590/0103-6513.20190078

Ahmad, K., JianMing, Z., & Rafi, M. (2020). Librarian's perspective for the implementation of big data analytics in libraries on the bases of lean-startup model. *Digital Library Perspectives, 36*(1), 21–37. https://doi.org/10.1108/DLP-04-2019-0016

Armstrong, C. E. (2017). Running lean startup in the classroom: from idea to experiment in 1 week. *Management Teaching Review, 2*(2), 132–140. https://doi.org/10.1177/2379298116683215

Aulet, B. (2013). *Disciplined entrepreneurship – 24 steps to a successful startup*. John Wiley &Sons.

Ávalos, C., Pérez-Escoda, A., & Monge, L. (2019). Lean startup as a learning methodology for developing digital and research competencies. *Journal of New Approaches in Educational Research, 8*(2), 227–242. https://doi.org/10.7821/naer.2019.7.438

Axelson, M., & Bjurström, E. (2019). The role of timing in the business model evolution of spinoffs. *Research-Technology Management, 62*(4), 19–26. https://doi.org/10.1080/08956308.2019.1613116

Bajwa, S. S., Wang, X., Nguyen Duc, A., & Abrahamsson, P. (2017). "Failures" to be celebrated: an analysis of major pivots of software startups. *Empirical Software Engineering, 22*(5), 2373–2408. https://doi.org/10.1007/s10664-016-9458-0

Baldassarre, B., Calabretta, G., Bocken, N. M. P., & Jaskiewicz, T. (2017). Bridging sustainable business model innovation and user-driven innovation: a process for sustainable value proposition design. *Journal of Cleaner Production, 147*, 175–186. https://doi.org/10.1016/j.jclepro.2017.01.081

Balocco, R., Cavallo, A., Ghezzi, A., & Berbegal-Mirabent, J. (2019). Lean business models change process in digital entrepreneurship. *Business Process Management Journal, 25*(7), 1520–1542. https://doi.org/10.1108/BPMJ-07-2018-0194

Baloutsos, S., Karagiannaki, A., & Mourtos, I. (2020). Business model generation for industry 4.0: a "lean startup" approach. *The International Technology Management Review, 9*(1), 34–45. https://doi.org/10.2991/itmr.k.200630.001

Baregheh, A., Rowley, J., & Sambrook, S. (2009). Towards a multidisciplinary definition of innovation. *Management Decision, 47*(8), 1323–1339. https://doi.org/10.1108/00251740910984578

Bayik, M. (2017). Innovative processes in new product and service development. In Ü. Hacioğlu, H. Dinçer, & N. Alayoğlu (Eds.), *Global Business Strategies in Crisis: Strategic Thinking and Development* (pp. 215–229). Springer International Publishing. https://doi.org/10.1007/978-3-319-44591-5_15

Beck, K., Beedle, M., Van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., Grenning, J., Highsmith, J., Hunt, A., & Jeffries, R. (2001). *Manifesto for agile software development.* Snowbird, UT. http://agilemanifesto.org/

Bedeian, A. G. (2004). Peer review and the social construction of knowledge in the management discipline. *Academy of Management Learning & Education, 3*(2), 198–216. https://doi.org/10.5465/amle.2004.13500489

Bessant, J. R., & Tidd, J. (2015). *Innovation and entrepreneurship.* John Wiley & Sons.

Bianchi, M., Marzi, G., & Guerini, M. (2020). Agile, stage-gate and their combination: exploring how they relate to performance in software development. *Journal of Business Research, 110*, 538–553. https://doi.org/10.1016/j.jbusres.2018.05.003

Bieraugel, M. (2015). Managing library innovation using the lean startup method. *Library Management, 36*(4/5), 351–361. https://doi.org/10.1108/LM-10-2014-0131

Blank, S. (2013). Why the lean start-up changes everything. *Harvard Business Review, 91*(5), 63–72.

Blank, S. (2020). *The four steps to the epiphany: successful strategies for products that win*. John Wiley & Sons.

Blank, S., & Dorf, B. (2012). *The startup owner's manual: the step-by-step guide for building a great company.* K&S Ranch, Inc.

Blank, S., & Euchner, J. (2018). The genesis and future of lean startup: an interview with Steve Blank. *Research-Technology Management, 61*(5), 15–21. https://doi.org/10.1080/08956308.2018.1495963

Bocken, N. M. P., Miller, K., Weissbrod, I., Holgado, M., & Evans, S. (2017). Business model experimentation for circularity: driving sustainability in a large international clothing retailer. *Economics and Policy of Energy and the Environment, 2017*(1), 85–122. https://doi.org/10.3280/EFE2017-001006

Bocken, N. M. P., Schuit, C. S. C., & Kraaijenhagen, C. (2018). Experimenting with a circular business model: lessons from eight cases. *Environmental Innovation and Societal Transitions, 28*, 79–95. https://doi.org/10.1016/j.eist.2018.02.001

Bocken, N. M. P., & Snihur, Y. (2020). Lean startup and the business model: experimenting for novelty and impact. *Long Range Planning, 53*(4), 101953. https://doi.org/10.1016/j.lrp.2019.101953

Boehm, B. (1995). A spiral model of software development and enhancement. In R. M. Baecker, J. Grudin, W. A. S. Buxton, & S. Greenberg (Eds.), *Readings in Human–Computer Interaction* (pp. 281–292). Morgan Kaufmann. https://doi.org/10.1016/B978-0-08-051574-8.50031-5

Bohn, N., & Kundisch, D. (2020). What are we talking about when we talk about technology pivots? – A Delphi study. *Information & Management, 57*(6), 103319. https://doi.org/10.1016/j.im.2020.103319

Bohnsack, R., & Liesner, M. M. (2019). What the hack? A growth hacking taxonomy and practical applications for firms. *Business Horizons, 62*(6), 799–818. https://doi.org/10.1016/j.bushor.2019.09.001

Boni, A. (2016). Emerging business models and strategies to accelerate innovation in the biopharmaceutical industry. *Journal of Commercial Biotechnology, 22*(4), 53–59.https://doi.org/10.5912/jcb753

Bortolini, R. F., Nogueira Cortimiglia, M., Danilevicz, A. de M. F., & Ghezzi, A. (2021). Lean startup: a comprehensive historical review. *Management Decision, 59*(8), 1765–1783. https://doi.org/10.1108/MD-07-2017-0663

Brecht, P., Hendriks, D., Stroebele, A., Hahn, C., & Wolff, I. (2021). Discovery and validation of business models: How B2B startups can use business experiments. *Technology Innovation Management Review, 11*(3), 17–31. https://doi.org/10.22215/timreview/1426

Brecht, P., Niever, M., Kerres, R., Ströbele, A., & Hahn, C. H. (2021). Smart platform experiment cycle (SPEC): a process to design, analyze, and validate digital platforms. *Artificial Intelligence for Engineering Design, Analysis and Manufacturing, 35*(2), 209–225. https://doi.org/10.1017/S0890060421000081

Brown, T. (2008). Design thinking. *Harvard Business Review, 86*(6), 84–92.

Brown, T. (2022). *Design thinking defined. IDEO | Design Thinking*. https://designthinking.ideo.com/

Buhl, A. (2018). Do it yourself—A lean startup toolbox for employee-driven green product innovation. *International Journal of Entrepreneurship and Innovation Management, 22*(4–5), 526–544. https://doi.org/10.1504/IJEIM.2018.092971

Burgi, P.-Y., Blumer, E., & Makhlouf-Shabou, B. (2017). Research data management in Switzerland: national efforts to guarantee the sustainability of research outputs. *IFLA Journal, 43*(1), 5–21. https://doi.org/10.1177/0340035216678238

Čalopa, M. K., Kokot, K., & Kokotec, I. Đ. (2020). Level of knowledge and implementation of lean methodology in small and medium-sized Croatian companies. *TEM Journal, 9*(1), 276-285. https://doi.org/10.18421/TEM91-38

Carroll, R., & Casselman, R. M. (2019). The lean discovery process: the case of raiserve. *Journal of Small Business and Enterprise Development, 26*(6/7), 765–782. https://doi.org/10.1108/JSBED-04-2019-0124

Cavallo, A., Ghezzi, A., & Ruales Guzmán, B. V. (2019). Driving internationalization through business model innovation: evidences from an AgTech company. *Multinational Business Review, 28*(2), 201–220. https://doi.org/10.1108/MBR-11-2018-0087

Chesbrough, H., & Tucci, C. L. (2020). The interplay between open innovation and lean startup, or, why large companies are not large versions of startups. *Strategic Management Review, 1*(2), 277–303. https://doi.org/10.1561/111.00000013

Clark, K. B., & Wheelwright, S. C. (1992). *Managing new product and process development: text and cases*. Harvard Business School.

Contigiani, A., & Levinthal, D. A. (2019). Situating the construct of lean start-up: adjacent conversations and possible future directions. *Industrial and Corporate Change, 28*(3), 551–564. https://doi.org/10.1093/icc/dtz013

Cooper, R. G. (1990). Stage-gate systems: a new tool for managing new products. *Business Horizons, 33*(3), 44–54. https://doi.org/10.1016/0007-6813(90)90040-I

Cooper, R. G. (2008). Perspective: the Stage-Gate® idea-to-launch process—update, what's new, and nexgen systems. *Journal of Product Innovation Management, 25*(3), 213–232. https://doi.org/10.1111/j.1540-5885.2008.00296.x

Cooper, R. G., & Edgett, S. J. (2009). *Lean, rapid and profitable new product development*. Product Development Institute.

Cooper, R. G., & Kleinschmidt, E. J. (1996). Winning businesses in product development: the critical success factors. *Research-Technology Management, 39*(4), 18–29. https://doi.org/10.1080/08956308.1996.11671073

Cooper, R. G., & Kleinschmidt, E. J. (2011). *New products: the key factors in success*. Marketing Classics Press, Inc.

Coviello, N., & Tanev, S. (2017). Initiating a new research phase in the field of international entrepreneurship: an interview with professor Nicole Coviello. *Technology Innovation Management Review, 7*(5), 52–56. http://timreview.ca/article/1077

Crossan, M. M., & Apaydin, M. (2010). A multi-dimensional framework of organizational innovation: a systematic review of the literature. *Journal of Management Studies, 47*(6), 1154–1191. https://doi.org/10.1111/j.1467-6486.2009.00880.x

Czinkota, M. R., Kotabe, M., Vrontis, D., & Shams, S. M. R. (2021). Product and service decisions. In M. R. Czinkota, M. Kotabe, D. Vrontis, & S. M. R. Shams (Eds.), *Marketing Management: Past, Present and Future* (pp. 341–397). Springer International Publishing. https://doi.org/10.1007/978-3-030-66916-4_8

Dahle, Y., Nguyen-Duc, A., Steinert, M., & Reuther, K. (2020). Six pillars of modern entrepreneurial theory and how to use them. In A. Nguyen-Duc, J. Münch, R. Prikladnicki, X. Wang, & P. Abrahamsson (Eds.), *Fundamentals of Software Startups: Essential Engineering and Business Aspects* (pp. 3–25). Springer International Publishing. https://doi.org/10.1007/978-3-030-35983-6_1

De Cock, R., Bruneel, J., & Bobelyn, A. (2020). Making the lean start-up method work: the role of prior market knowledge. *Journal of Small Business Management, 58*(5), 975–1002. https://doi.org/10.1111/jsbm.12506

DelVecchio, J., White, F., & Phelan, S. (2013). *Tools for innovation management: a comparison of lean startup and the stage gate system* (SSRN Scholarly Paper 2534138). https://doi.org/10.2139/ssrn.2534138

Di Benedetto, C. A. (1999). Identifying the key success factors in new product launch. *Journal of Product Innovation Management, 16*(6), 530–544. https://doi.org/10.1016/S0737-6782(99)00014-4

Dougherty, D., & Hardy, C. (1996). Sustained product innovation in large, mature organizations: overcoming innovation-to-organization problems. *The Academy of Management Journal, 39*(5), 1120–1153. https://doi.org/10.2307/256994

Drucker, P. F. (2006). *Innovation and entrepreneurship*. Harper.

Dybå, T., & Dingsøyr, T. (2008). Empirical studies of agile software development: a systematic review. *Information and Software Technology, 50*(9–10), 833–859. https://doi.org/10.1016/j.infsof.2008.01.006

Edison, H. (2020). Lean internal startups: challenges and lessons learned. In A. Nguyen-Duc, J. Münch, R. Prikladnicki, X. Wang, & P. Abrahamsson (Eds.), *Fundamentals of Software Startups: Essential Engineering and Business Aspects* (pp. 251–268). Springer International Publishing. https://doi.org/10.1007/978-3-030-35983-6_15

Edison, H., Smørsgård, N. M., Wang, X., & Abrahamsson, P. (2018). Lean internal startups for software product innovation in large companies: enablers and inhibitors. *Journal of Systems and Software, 135*, 69–87. https://doi.org/10.1016/j.jss.2017.09.034

Edison, H., Wang, X., & Abrahamsson, P. (2015). Lean startup: why large software companies should care. *Scientific Workshop Proceedings of the XP2015*, 1–7. https://doi.org/10.1145/2764979.2764981

Eisenmann, T. R., Ries, E., & Dillard, S. (2012). Hypothesis-driven entrepreneurship: the lean startup. *Harvard Business School Entrepreneurial Management Case*, 812–095.

Euchner, J. (2019). Yes … and: making lean startup work in large organizations. *Research-Technology Management, 62*(6), 36–43. https://doi.org/10.1080/08956308.2019.1661080

European Commission. (2015). *Global trends to 2030: can the EU meet the challenges ahead?* Publications Office. https://data.europa.eu/doi/10.2796/25769

Fagerholm, F., Sanchez Guinea, A., Mäenpää, H., & Münch, J. (2017). The right model for continuous experimentation. *Journal of Systems and Software, 123*, 292–305. https://doi.org/10.1016/j.jss.2016.03.034

Falagas, M. E., Pitsouni, E. I., Malietzis, G. A., & Pappas, G. (2008). Comparison of PubMed, Scopus, Web of Science, and Google Scholar: strengths and weaknesses. *FASEB Journal, 22*(2), 338–342. https://doi.org/10.1096/fj.07-9492LSF

Felin, T., Gambardella, A., Stern, S., & Zenger, T. (2020). Lean startup and the business model: experimentation revisited. *Long Range Planning, 53*(4), 101889. https://doi.org/10.1016/j.lrp.2019.06.002

Frederiksen, D. L., & Brem, A. (2017). How do entrepreneurs think they create value? A scientific reflection of Eric Ries' lean startup approach. *International Entrepreneurship and Management Journal, 13*(1), 169–189. https://link.springer.com/article/10.1007/s11365-016-0411-x

Furr, N. R., & Dyer, J. (2014). *The innovator's method: bringing the lean startup into your organization*. Harvard Business Review Press.

Gaffney, S., Lin, S., Miller, K., Nilsson, H., Ravala, S., & Unnikrishnan, M. (2014). Lean start-up methodology for enterprises: how established companies can leverage lean startup methodology for sustaining and disruptive innovation. University of California Berkeley, Insights in Engineering Leadership White Paper. https://ikhlaqsidhu.files.wordpress.com/2014/08/elpp-project-1-lean-startup-for-enterprises-final-3.pdf

Ganguly, A., & Euchner, J. (2018). Conducting business experiments: validating new business models well-designed business experiments can help validate assumptions and reduce risk associated with new business models. *Research-Technology Management, 61*(2), 27–36. https://doi.org/10.1080/08956308.2018.1421381

Gay, A. K. (2014). Start me up: lean screenwriting for american entrepreneurial cinema. *Journal of Screenwriting, 5*(2), 259–275. https://doi.org/10.1386/josc.5.2.259_1

Gbadegeshin, S. (2018). Lean commercialization: a new framework for commercializing high technologies. *Technology Innovation Management Review, 8*(9), 50–63. https://doi.org/10.22215/timreview/1186

Geissdoerfer, M., Bocken, N. M. P., & Hultink, E. J. (2016). Design thinking to enhance the sustainable business modelling process – A workshop based on a value mapping process. *Journal of Cleaner Production, 135*, 1218–1232. https://doi.org/10.1016/j.jclepro.2016.07.020

Ghezzi, A. (2019). Digital startups and the adoption and implementation of lean startup approaches: effectuation, bricolage and opportunity creation in practice. *Technological Forecasting and Social Change, 146*, 945–960. https://doi.org/10.1016/j.techfore.2018.09.017

Ghezzi, A. (2020). How entrepreneurs make sense of lean startup approaches: business models as cognitive lenses to generate fast and frugal heuristics. *Technological Forecasting and Social Change, 161*, 120324. https://doi.org/10.1016/j.techfore.2020.120324

Ghezzi, A., & Cavallo, A. (2020). Agile business model innovation in digital entrepreneurship: lean startup approaches. *Journal of Business Research, 110*, 519–537. https://doi.org/10.1016/j.jbusres.2018.06.013

Ghorashi, H., & Asghari, R. (2019). Minimum viable accelerator: planning, starting and improving startup accelerator programs under a lean approach. *American Journal of Management, 19*(2). https://doi.org/10.33423/ajm.v19i2.2064

Grossman, E. (2016). Weighing in: reflections on a steady diet of lean startup. *Annals of Entrepreneurship Education and Pedagogy – 2016*, 109–126. https://doi.org/10.4337/9781784719166.00012

Guinan, P. J., & Parise, S. (2017). Pilot, pivot, and pitch: applying a rapid value realization approach to designing digital solutions at Johnson & Johnson. *Technology, Operations & Information Management Working Papers*., 9–2017. https://digitalknowledge.babson.edu/toimwp/11/

Harms, R. (2015). Self-regulated learning, team learning and project performance in entrepreneurship education: learning in a lean startup environment. *Technological Forecasting and Social Change, 100*, 21–28. https://doi.org/10.1016/j.techfore.2015.02.007

Harms, R., Marinakis, Y., & Walsh, S. T. (2015). Lean startup for materials ventures and other science-based ventures: under what conditions is it useful? *Translational Materials Research, 2*(3), 035001. https://doi.org/10.1088/2053-1613/2/3/035001

Harms, R., & Schwery, M. (2020). Lean startup: operationalizing lean startup capability and testing its performance implications. *Journal of Small Business Management, 58*(1), 200–223. https://doi.org/10.1080/00472778.2019.1659677

Hill, C. W. L., Jones, G. R., & Schilling, M. A. (2014). *Strategic management theory: an integrated approach*. Cengage Learning.

Hopewell, S., Clarke, M., & Mallett, S. (2005). Grey literature and systematic reviews. In H. R. Rothstein, A. J. Sutton, & M. Borenstein (Eds.), *Publication Bias in Meta-Analysis: Prevention, Assessment and Adjustments* (pp. 49–72). John Wiley & Sons, Ltd. https://doi.org/10.1002/0470870168.ch4

Humphreys, A. (2015). Really, really rapid prototyping: flash builds and user-driven innovation at JSTOR Labs. *Information Services and Use, 35*(1–2), 71–75. https://doi.org/10.3233/ISU-150763

Hwang, S., & Shin, J. (2019). Using lean startup to power organizational transformation: creating an internal division that implemented concepts from lean startup helped a consumer electronics firm foster an entrepreneurial mindset among employees. *Research-Technology Management, 62*(5), 40–49. https://doi.org/10.1080/08956308.2019.1638224

Iazzolino, G., Greco, D., Verteramo, S., Attanasio, A. L., Carravetta, G., & Granato, T. (2020). An integrated methodology for supporting the development and the performance evaluation of academic spin-offs. *Measuring Business Excellence, 24*(1), 69–89. https://doi.org/10.1108/MBE-09-2019-0097

Johnson, A. E., Winner, L., Simmons, T., Eid, S. M., Hody, R., Sampedro, A., Augustine, S., Sylvester, C., & Parakh, K. (2016). Using innovative methodologies from technology and manufacturing companies to reduce heart failure readmissions. *American Journal of Medical Quality, 31*(3), 272–278. https://doi.org/10.1177/1062860614562627

Jurado, S., & Olano, M. (2014). *Lean elephants: addressing the innovation challenge in big companies*. Innovation and Research Telefonica.

Kaylan, K. B., Russel, S. M., Justice, C. N., Sheena, M. K., Hirshfield, L. E., Heiman, H. L., & Curry, R. H. (2021). Applying the lean startup method to structure project-based, student-driven curricular enhancements. *Teaching and Learning in Medicine, 14,* 1–10. https://doi.org/10.1080/10401334.2021.1928501

Khandros, M. (2019). Philadelphia anchors for growth and equity: applying the lean startup methodology to build a financially sustainable anchor collaborative. *Metropolitan Universities, 30*(1), 17–36. https://doi.org/10.18060/22412

Koberg, C. S., Uhlenbruck, N., & Sarason, Y. (1996). Facilitators of organizational innovation: the role of life-cycle stage. *Journal of Business Venturing, 11*(2), 133–149. https://doi.org/10.1016/0883-9026(95)00107-7

König, M., Ungerer, C., Baltes, G., & Terzidis, O. (2019). Different patterns in the evolution of digital and non-digital ventures' business models. *Technological Forecasting and Social Change, 146*, 844–852. https://doi.org/10.1016/j.techfore.2018.05.006

Ladd, T., & Kendall, L. (2017). Resolving the risk paradox: entrepreneurial cognition in the lean startup method. *Journal of Applied Business and Economics, 19*(11), 27–41. https://articlearchives.co/index.php/JABE/article/view/693

Lalic, M., Calopa, M. K., & Horvat, J. (2012). Lean startup in Croatia—Does the Croatian startup scene develop effective enterprises? *TEM Journal, 1*(3), 200–207. https://www.temjournal.com/documents/vol1no3/pdf/Lean%20Startup%20in%20Croatia.pdf

Lazo-Durand, R., Rojas-Garcia, J., Torres-Sifuentes, C., & Raymundo, C. (2021). Lean startup in a commercial management model based on digital marketing to increase sales in companies of the health food industry. In Y. Iano, R. Arthur, O. Saotome, G. Kemper, & R. PadilhaFrança (Eds.), *Proceedings of the 5th Brazilian Technology Symposium* (pp. 373–380). Springer International Publishing. https://doi.org/10.1007/978-3-030-57548-9_34

Leal, L. F., Ribeiro, A. T. V. B., Romão, V., Amaral, G. S. G. do, Altmann, R., Kahn, R., Pacci, B. G., Avo, M., Salerno, M. S., Plonski, G. A., & Zancul, E. (2021). R&D approach based on multiple partners and design thinking, lean startup, and agile concepts: a case study in the electricity sector. *Brazilian Journal of Operations & Production Management, 18*(1), 1–12. https://doi.org/10.14488/BJOPM.2021.003

Leatherbee, M., & Katila, R. (2020). The lean startup method: early-stage teams and hypothesis-based probing of business ideas. *Strategic Entrepreneurship Journal, 14*(4), 570–593. https://doi.org/10.1002/sej.1373

Lichtenthaler, U. (2020a). A conceptual framework for combining agile and structured innovation processes. *Research-Technology Management, 63*(5), 42–48. https://doi.org/10.1080/08956308.2020.1790240

Lichtenthaler, U. (2020b). Agile innovation: the complementarity of design thinking and lean startup. *International Journal of Service Science, Management, Engineering, and Technology, 11*(1), 157–167. https://doi.org/10.4018/IJSSMET.2020010110

Lindgren, E., & Münch, J. (2016). Raising the odds of success: the current state of experimentation in product development. *Information and Software Technology, 77*, 80–91. https://doi.org/10.1016/j.infsof.2016.04.008

Lizarelli, F. L., Torres, A. F., Antony, J., Ribeiro, R., Salentijn, W., Fernandes, M. M., & Campos, A. T. (2022). Critical success factors and challenges for lean startup: a systematic literature review. *The TQM Journal, 34*(3), 534–551. https://doi.org/10.1108/TQM-06-2021-0177

Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *The Academy of Management Review, 21*(1), 135–172. https://doi.org/10.2307/258632

Lynn, G. S., Morone, J. G., & Paulson, A. S. (1996). Marketing and discontinuous innovation: the probe and learn process. *California Management Review, 38*(3), 8–37. https://doi.org/10.2307/41165841

Magistretti, S., Trabucchi, D., Dell'Era, C., & Buganza, T. (2019). A new path toward a hybrid model: insights from PwC's italian experience centre. *Research-Technology Management, 62*(5), 30–37. https://doi.org/10.1080/08956308.2019.1638223

Mansoori, Y. (2017). Enacting the lean startup methodology: the role of vicarious and experiential learning processes. *International Journal of Entrepreneurial Behavior& Research, 23*(5), 812–838. https://doi.org/10.1108/IJEBR-06-2016-0195

Mansoori, Y., Karlsson, T., & Lundqvist, M. (2019). The influence of the lean startup methodology on entrepreneur-coach relationships in the context of a startup accelerator. *Technovation, 84–85*, 37–47. https://doi.org/10.1016/j.technovation.2019.03.001

Mansoori, Y., & Lackéus, M. (2020). Comparing effectuation to discovery-driven planning, prescriptive entrepreneurship, business planning, lean startup, and design thinking. *Small Business Economics, 54*(3), 791–818. https://doi.org/10.1007/s11187-019-00153-w

Martín-Martín, A., Orduna-Malea, E., Thelwall, M., & López-Cózar, E. D. (2018). Google Scholar, Web of Science, and Scopus: a systematic comparison of citations in 252 subject categories. *Journal of Informetrics, 12*(4), 1160–1177. https://doi.org/10.1016/j.joi.2018.09.002

McGrath, R. G., & MacMillan, I. (2000). *The entrepreneurial mindset: strategies for continuously creating opportunity in an age of uncertainty*. Harvard Business SchoolPress.

Millán Vázquez de la Torre, M. G., Millán Lara, S., & Arjona-Fuentes, J. M. (2019). Flamenco tourism from the viewpoint of its protagonists: a sustainable vision using lean startup methodology. *Sustainability, 11*(21), 6047. https://doi.org/10.3390/su11216047

Miski, A. (2014). Development of a mobile application using the lean startup methodology. *International Journal of Scientific & Engineering Research, 5*(1), 1743–1748.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of Internal Medicine, 151*(4), 264–269. https://doi.org/10.7326/0003-4819-151-4-200908180-00135

Moogk, D. R. (2012). Minimum viable product and the importance of experimentation in technology startups. *Technology Innovation Management Review, 2*(3), 23–26. https://timreview.ca/sites/default/files/article_PDF/RancicMoogk_TIMReview_March2012.pdf

Müller, R. M., & Thoring, K. (2012). Design thinking vs. lean startup: a comparison of two user-driven innovation strategies. *Leading Innovation Through Design, 2012 International Design Management Research Conference.*

Nashaat, M., Ghosh, A., Miller, J., Quader, S., & Marston, C. (2019). M-Lean: an end-to-end development framework for predictive models in B2B scenarios. *Information and Software Technology, 113*, 131–145. https://doi.org/10.1016/j.infsof.2019.05.009

Neubert, M. (2017). Lean internationalization: how to globalize early and fast in a small economy. *Technology Innovation Management Review, 7*(5), 16–22. https://doi.org/10.22215/timreview/1073

Neubert, M. (2018). The impact of digitalization on the speed of internationalization of lean global startups. *Technology Innovation Management Review, 8*(5), 44–54. https://doi.org/10.22215/timreview/1158

Newbert, S. L., Tornikoski, E. T., & Augugliaro, J. (2020). To get out of the building or not? That is the question: the benefits (and costs) of customer involvement during the startup process. *Journal of Business Venturing Insights, 14,* e00209. https://doi.org/10.1016/j.jbvi.2020.e00209

Nientied, P. (2015). Polis University as lean startup innovation. *International Business Research, 8*(5), 19–29. https://doi.org/10.5539/ibr.v8n5p19

Nirwan, M. D., & Dhewanto, W. (2015). Barriers in implementing the lean startup methodology in Indonesia – Case study of B2B startup. *Procedia - Social and Behavioral Sciences, 169*, 23–30. https://doi.org/10.1016/j.sbspro.2015.01.282

Ohno, T. (1988). *Toyota Production System: Beyond Large-Scale Production.* CRC Press.

Olsson, H. H., Alahyari, H., & Bosch, J. (2012). Climbing the 'stairway to heaven' – A mulitiple-case study exploring barriers in the transition from agile development towards continuous deployment of software. *38th Euromicro Conference on Software Engineering and Advanced Applications,* 392–399. https://doi.org/10.1109/SEAA.2012.54

Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers*. John Wiley & Sons.

Osterwalder, A., Pigneur, Y., Bernarda, G., Smith, A., & Papadakos, T. (2014). *Value proposition design: how to create products and services customers want*. John Wiley & Sons.

Owens, T., & Fernandez, O. (2014). *The lean enterprise: how corporations can innovate like startups*. John Wiley &Sons.

Peralta, C. B. da L., Echeveste, M. E., Lermen, F. H., Marcon, A., & Tortorella, G. (2020). A framework proposition to identify customer value through lean practices. *Journal of Manufacturing Technology Management, 31*(4), 725–747. https://doi.org/10.1108/JMTM-06-2019-0209

Peralta, C. B. da L., Echeveste, M. E., Martins, V. L. M., & Lermen, F. H. (2020). Applying the framework to identify customer value: a case of sustainable product in agriculture. *Journal of Cleaner Production, 270*, 122384. https://doi.org/10.1016/j.jclepro.2020.122384

Phillips, R., Neailey, K., & Broughton, T. (1999). A comparative study of six stage-gate approaches to product development. *Integrated Manufacturing Systems, 10*(5), 289–297. https://doi.org/10.1108/09576069910371106

Picken, J. C. (2017). From startup to scalable enterprise: laying the foundation. *Business Horizons, 60*(5), 587–595. https://doi.org/10.1016/j.bushor.2017.05.002

Pillai, S. D., Goldfarb, B., & Kirsch, D. A. (2020). The origins of firm strategy: learning by economic experimentation and strategic pivots in the early automobile industry. *Strategic Management Journal, 41*(3), 369–399. https://doi.org/10.1002/smj.3102

Podsakoff, P. M., MacKenzie, S. B., Bachrach, D. G., & Podsakoff, N. P. (2005). The influence of management journals in the 1980s and 1990s. *Strategic Management Journal, 26*(5), 473–488. https://doi.org/10.1002/smj.454

Popowska, M., & Nalepa, P. (2015). Lean startup as a new way of managing technology ventures illustrated by the example of Wlcome App. *Studia imateriały, 19*, 7–21. https://doi.org/10.7172/1733-9758.2015.19.1

Poppendieck, M., & Poppendieck, T. (2003). *Lean software development: an agile toolkit*. Addison Wesley.

Power, B. (2014). How GE applies lean startup practices. Harvard Business Review. https://hbr.org/2014/04/how-ge-applies-lean-startup-practices

Qin, Y., Yan, R., & Sun, Y. (2020). The application of flipped classroom combined with locus of control analysis in lean entrepreneurship education for college students. *Frontiers in Psychology, 11*, 1587. https://doi.org/10.3389/fpsyg.2020.01587

Racolţa-Paina, N. D., & Andrieş, A. M. (2017). Identifying entrepreneurship readiness for the application of the lean startup practices in the service industry – Case study Romania. *Ecoforum Journal, 6*(3 (13)). http://www.ecoforumjournal.ro/index.php/eco/article/view/688

Ranaweera, J., Weaving, D., Zanin, M., Pickard, M. C., & Roe, G. (2022). Digitally optimizing the information flows necessary to manage professional athletes: a case study in Rugby Union. *Frontiers in Sports and Active Living, 4*, 850885.https://doi.org/10.3389/fspor.2022.850885

Rasmussen, E., & Petersen, N. (2017). Platforms for innovation and internationalization. *Technology Innovation Management Review, 7*(5), 23–31. https://doi.org/10.22215/timreview/1074

Rasmussen, E., & Tanev, S. (2015). The emergence of the lean global startup as a new type of firm. *Technology Innovation Management Review, 5*(11), 12–19. https://doi.org/10.22215/timreview/941

Reis, D. A. dos, Fleury, A. L., Bento, T., Fabbri, K., Ortega, L. M., & Bagnato, V. (2019). Application of new agile approaches at University of São Paulo innovation agency's entrepreneurship and innovation course. *Gestão&Produção, 26*(4), e4122. https://doi.org/10.1590/0104-530X4122-19

Reis, D. A. dos, Fleury, A. L., & de Carvalho, M. M. (2021). Toward a recursive stage-based framework for supporting startup business initiation: an exploratory study with entrepreneurs. *IEEE Transactions on Engineering Management, 68*(4), 999–1013. https://doi.org/10.1109/TEM.2019.2917406

Ries, E. (2011). *The lean startup: how today's entrepreneurs use continuous innovation to create radically successful businesses*. Crown Business.

Ries, E. (2017). *The startup way: how modern companies use entrepreneurial management to transform culture and drive long-term growth*. Currency.

Rigby, D. K., Sutherland, J., & Takeuchi, H. (2016). Embracing agile: how to master the process that's transforming management. *Harvard Business Review, 94*(5), 40–50.

Robb, C. C., Rahn, D., & Buffardi, K. (2020). Bridging the gap: a model for interdisciplinary collaboration between entrepreneurship and software engineering students. *Journal of Education for Business, 95*(5), 321–330. https://doi.org/10.1080/08832323.2019.1644275

Rübling, S. T. (2016). How lean is a startup? – Development and validation of a scale for measuring the degree of leanness. *Frontiers of Entrepreneurship Research, 36*(9), 13.

Salnikova, E., Baglione, S. L., & Stanton, J. L. (2019). To launch or not to launch: an empirical estimate of new food product success rate. *Journal of Food Products Marketing, 25*(7), 771–784. https://doi.org/10.1080/10454446.2019.1661930

Sarasvathy, S. D. (2001). Causation and effectuation: toward a theoretical shift from economic inevitability to entrepreneurial contingency. *The Academy of Management Review, 26*(2), 243–263. https://doi.org/10.2307/259121

Scheuenstuhl, F., Bican, P. M., & Brem, A. (2021). How can the lean startup approach improve the innovation process of established companies? An experimental approach. *International Journal of Innovation Management, 25*(03), 2150029. https://doi.org/10.1142/S1363919621500298

Schultz, C. (2022). A balanced strategy for entrepreneurship education: engaging students by using multiple course modes in a business curriculum. *Journal of Management Education, 46*(2), 313–344. https://doi.org/10.1177/10525629211017958

Schuurman, D., & Protic, S. M. (2018). Living labs versus lean startups: an empirical investigation. *Technology Innovation Management Review, 8*(12), 7–16. https://timreview.ca/sites/default/files/article_PDF/SchuurmanProtic_TIMReview_December2018.pdf

Seggie, S. H., Soyer, E., & Pauwels, K. H. (2017). Combining big data and lean startup methods for business model evolution. *AMS Review, 7*(3), 154–169. https://doi.org/10.1007/s13162-017-0104-9

Semcow, K., & Morrison, J. K. (2018). Lean startup for social impact: refining the National Science Foundation's Innovation Corps model to spur social science innovation. *Social Enterprise Journal, 14*(3), 248–267. https://doi.org/10.1108/SEJ-02-2018-0013

Shanbhag, N., & Pardede, E. (2019). A metrics framework for product development in software startups. *Journal of Enterprising Culture, 27*(03), 283–307. https://doi.org/10.1142/S0218495819500110

Shepherd, D. A., & Gruber, M. (2021). The lean startup framework: closing the academic–practitioner divide. *Entrepreneurship Theory and Practice, 45*(5), 967–998. https://doi.org/10.1177/1042258719899415

Shiradkar, S., Rabelo, L., Alasim, F., & Nagadi, K. (2021). Virtual world as an interactive safety training platform. *Information, 12*(6), 219. https://doi.org/10.3390/info12060219

Silva, D. S., Ghezzi, A., Aguiar, R. B. de, Cortimiglia, M. N., & ten Caten, C. S. (2020). Lean startup, agile methodologies and customer development for business model innovation: a systematic review and research agenda. *International Journal of Entrepreneurial Behavior& Research, 26*(4), 595–628. https://doi.org/10.1108/IJEBR-07-2019-0425

Silva, D. S., Ghezzi, A., Aguiar, R. B. de, Cortimiglia, M. N., & ten Caten, C. S. (2021). Lean startup for opportunity exploitation: adoption constraints and strategies in technology new ventures. *International Journal of Entrepreneurial Behavior& Research, 27*(4), 944–969. https://doi.org/10.1108/IJEBR-01-2020-0030

Simon-Kucher & Partners. (2014). *Global pricing study 2014*. Simon-Kucher & Partners.

Solaimani, S., van Eck, T., Kievit, H., & Koelemeijer, K. (2022). An exploration of the applicability of lean startup in small non-digital firms: an effectuation perspective. *International Journal of Entrepreneurial Behavior & Research, 28*(9), 198–218. https://doi.org/10.1108/IJEBR-04-2021-0270

Sońta-Drączkowska, E., & Mrożewski, M. (2020). Exploring the role of project management in product development of new technology-based firms. *Project Management Journal, 51*(3), 294–311. https://doi.org/10.1177/8756972819851939

Stevenson, H. H., & Jarillo, J. C. (2007). A paradigm of entrepreneurship: entrepreneurial management. In Á. Cuervo, D. Ribeiro, & S. Roig (Eds.), *Entrepreneurship: Concepts, Theory and Perspective* (pp. 155–170). Springer. https://doi.org/10.1007/978-3-540-48543-8_7

Still, K. (2017). Accelerating research innovation by adopting the lean startup paradigm. *Technology Innovation Management Review, 7*(5), 32–43. https://timreview.ca/article/1075

Sull, D. N. (2004). Disciplined entrepreneurship. *MIT Sloan Management Review, 46*(1), 88–89.

Tanev, S. (2012). Global from the start: the characteristics of born-global firms in the technology sector. *Technology Innovation Management Review, 2*(3), 5–8. https://timreview.ca/article/532

Tanev, S. (2017). Is there a lean future for global startups? *Technology Innovation Management Review, 7*(5), 6–15. https://timreview.ca/article/1072

Tohanean, D., & Weiss, P. (2019). Digital entrepreneurship and green business model innovation: lean startup approaches. *Quality-Access to Success, 20*(S2), 630–634.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management, 14*(3), 207–222. https://doi.org/10.1111/1467-8551.00375

Traube, D. E., Begun, S., Petering, R., & Flynn, M. L. (2017). Beta testing in social work. *Research on Social Work Practice, 27*(2), 163–168. https://doi.org/10.1177/1049731516659142

Uansa-ard, S., & Wannamakok, W. (2020). Perception of lean startup and entrepreneurial intention: the mediating role of desirability and feasibility. *International Journal of Applied Behavioral Economics, 9*(4), 18–32. https://doi.org/10.4018/IJABE.2020100102

Vliet, B. V. (2020). A behavioural approach to the lean startup/minimum viable product process: the case of algorithmic financial systems. *International Journal of Innovation Management, 24*(03), 2050029. https://doi.org/10.1142/S1363919620500292

Wang, Q., & Waltman, L. (2016). Large-scale analysis of the accuracy of the journal classification systems of Web of Science and Scopus. *Journal of Informetrics, 10*(2), 347–364. https://doi.org/10.1016/j.joi.2016.02.003

Weissbrod, I., & Bocken, N. M. P. (2017). Developing sustainable business experimentation capability – A case study. *Journal of Cleaner Production, 142, Part 4*, 2663–2676. https://doi.org/10.1016/j.jclepro.2016.11.009

Welter, C., Scrimpshire, A., Tolonen, D., & Obrimah, E. (2021). The road to entrepreneurial success: business plans, lean startup, or both? *New England Journal of Entrepreneurship, 24*(1), 21–42. https://doi.org/10.1108/NEJE-08-2020-0031

West, J., & Bogers, M. (2014). Leveraging external sources of innovation: a review of research on open innovation. *Journal of Product Innovation Management, 31*(4), 814–831. https://doi.org/10.1111/jpim.12125

Xu, Y., & Koivumäki, T. (2019). Digital business model effectuation: an agile approach. *Computers in Human Behavior, 95*, 307–314. https://doi.org/10.1016/j.chb.2018.10.021

Yaman, S. G., Munezero, M., Münch, J., Fagerholm, F., Syd, O., Aaltola, M., Palmu, C., & Männistö, T. (2017). Introducing continuous experimentation in large software-intensive product and service organisations. *Journal of Systems and Software, 133*, 195–211. https://doi.org/10.1016/j.jss.2017.07.009

Yang, X., Sun, S. L., & Zhao, X. (2019). Search and execution: examining the entrepreneurial cognitions behind the lean startup model. *Small Business Economics, 52*(3), 667–679. https://doi.org/10.1007/s11187-017-9978-z

Yordanova, Z. B. (2017). Knowledge transfer from lean startup method to project management for boosting innovation projects' performance. *International Journal of Technological Learning, Innovation and Development, 9*(4), 293–309. https://doi.org/10.1504/IJTLID.2017.088959

Yordanova, Z. B. (2018). Lean startup method hampers breakthrough innovations and company's innovativeness. *International Journal of Innovation and Technology Management, 15*(02), 1850012. https://doi.org/10.1142/S0219877018500128

York, J. L., & Danes, J. E. (2014). Customer development, innovation, and decision-making biases in the lean startup. *Journal of Small Business Strategy, 24*(2), 21–40. https://libjournals.mtsu.edu/index.php/jsbs/article/view/191

York, J. M. (2018). Putting lean startup into perspective: a novel approach for discovering and developing a successful business model. *Archives of Business Administration and Management: ABAM-104*, 2018(01), 1–16. https://doi.org/10.29011/ABAM-104.100004

York, J. M. (2020). How do we define success with the lean startup? *Archives of Business Administration and Management, 3*(01), 1–9. https://doi.org/10.29011/2642-3243.100136

York, J. M., & York, J. L. (2019). The limits to lean startup for opportunity identification and new venture creation. *Archives of Business Administration and Management, 2*(2), 1–8. https://doi.org/10.29011/2642-3243.1000131

Youtie, J., & Shapira, P. (2017). Exploring public values implications of the I-Corps program. *The Journal of Technology Transfer, 42*(6), 1362–1376. https://doi.org/10.1007/s10961-016-9518-z

Zijdemans, E., & Tanev, S. (2014). Conceptualizing innovation in born-global firms. *Technology Innovation Management Review, 4*(9), 5–10. http://timreview.ca/article/826

Appendix

Appendix A: Summary Table of Papers Included in the Systematic Literature Review

Work number	Author/s and year	Type of organisation analysed or proposed application	Sector or field of application	Methodology used	Lean Startup framework proposed
1	Aas and Alaassar (2018)	Startup	Diverse sectors (digital and non-digital)	Qualitative (single case study)	
2	Aguiar et al. (2019)	Startup accelerator, business incubator, or science park	Advanced technologies across multiple sectors	Qualitative (single case study)	Lean Mentorship
3	Ahmad et al. (2020)	Established company	Libraries	Quantitative	-
4	Armstrong (2017)	University	Education	Conceptual/ Theoretical	-
5	Ávalos et al. (2019)	University	Education	Mixed (quantitative and qualitative)	-
6	Axelson and Bjurström (2019)	Established company (spin-off)	Advanced technologies across multiple sectors	Qualitative (single case study)	-
7	Bajwa et al. (2017)	Startup	Software	Qualitative (multiple case study)	-
8	Baldassarre et al. (2017)	Not defined. Comprising conceptual and theoretical works	Construction and energy efficiency	Qualitative (single case study)	Model for defining a sustainable value proposition
9	Balocco et al. (2019)	Startup	Digital	Qualitative (multiple case study)	SMED4BMC Model
10	Baloutsos et al. (2020)	Established company (large company)	Industry 4.0	Qualitative (multiple case study)	-
11	Bieraugel (2015)	Established company	Libraries	Conceptual/ Theoretical	-
12	Blank and Euchner (2018)	Governmental	Theoretical work	Other (SLR, interview)	-
13	Bocken and Snihur (2020)	Not defined. Comprising conceptual and theoretical works	Theoretical work	Conceptual/ Theoretical	-
14	Bocken et al. (2017)	Established company (large company)	Clothing retail	Qualitative (single case study)	-
15	Bocken et al. (2018)	Any type of organisation (established and startups)	Diverse sectors (digital and non-digital)	Qualitative (multiple case study)	Circular Business Experiment Cycle
16	Bohn and Kundisch (2020)	Startup	Digital	Qualitative (single case study)	-
17	Bohnsack and Liesner (2019)	Any type of organisation (established and startups)	Theoretical work	Conceptual/ Theoretical	-
18	Boni (2016)	Established company	Biopharmaceutical	Conceptual/ Theoretical	-
19	Bortolini et al. (2021)	Not defined. Comprising conceptual and theoretical works	Theoretical work	Other (SLR, interview)	-
20	Brecht, Hendriks, et al. (2021)	Startup	Agriculture	Qualitative (multiple case study)	B2B-Startup Experimentation Framework (B-SEF)
21	Brecht, Niever, et al. (2021)	Startup	Digital	Qualitative (single case study)	Smart Platform Experiment Cycle (SPEC)

Appendix A: Summary Table of Papers Included in the Systematic Literature Review (Continued)

22	Buhl (2018)	Any type of organisation (established and startups)	Diverse sectors (digital and non-digital)	Conceptual/ Theoretical	Toolbox for Green Product Innovation
23	Burgi et al. (2017)	Not defined. Comprising conceptual and theoretical works	Governmental	Qualitative (single case study)	-
24	Čalopa et al. (2020)	Startup accelerator, business incubator, or science park	Diverse sectors (digital and non-digital)	Quantitative	-
25	Carroll and Casselman (2019)	Startup	Digital	Qualitative (single case study)	Lean Discovery Process
26	Cavallo et al. (2019)	Established company (SME)	Agriculture	Qualitative (single case study)	-
27	Chesbrough and Tucci (2020)	Established company	Diverse sectors (digital and non-digital)	Conceptual/ Theoretical	-
28	Contigiani and Levinthal (2019)	Any type of organisation (established and startups)	Theoretical work	Conceptual/ Theoretical	-
29	Coviello and Tanev (2017)	Startup	Advanced technologies across multiple sectors	Other (SLR, interview)	-
30	De Cock et al. (2020)	Startup	Digital	Qualitative (multiple case study)	-
31	Edison et al. (2018)	Established company (large company)	Software	Qualitative (multiple case study)	-
32	Euchner (2019)	Established company	Theoretical work	Conceptual/ Theoretical	-
33	Fagerholm et al. (2017)	Any type of organisation (established and startups)	Software	Qualitative (multiple case study)	RIGHT Model
34	Felin et al. (2020)	Not defined. Comprising conceptual and theoretical works	Theoretical work	Conceptual/ Theoretical	-
35	Frederiksen and Brem (2017)	Any type of organisation (established and startups)	Theoretical work	Conceptual/ Theoretical	-
36	Ganguly and Euchner (2018)	Established company	Tyre manufacturing	Qualitative (single case study)	-
37	Gay (2014)	Startup	Cinema	Conceptual/ Theoretical	-
38	Gbadegeshin (2018)	Any type of organisation (established and startups)	Advanced technologies across multiple sectors	Qualitative (single case study)	Lean Commercialisation
39	Ghezzi and Cavallo (2020)	Startup	Digital	Qualitative (multiple case study)	-
40	Ghezzi (2019)	Startup	Digital	Mixed (quantitative and qualitative)	-
41	Ghezzi (2020)	Startup	Digital	Qualitative (multiple case study)	-
42	Ghorashi and Asghari (2019)	Startup	Startup accelerator	Conceptual/ Theoretical	Minimum Viable Accelerator (MVA)
43	Harms and Schwery (2020)	Startup	Software	Quantitative	-
44	Harms (2015)	University	Education	Quantitative	-
45	Harms et al. (2015)	Any type of organisation (established and startups)	Advanced materials	Conceptual/ Theoretical	-

Appendix A: Summary Table of Papers Included in the Systematic Literature Review (Continued)

46	Humphreys (2015)	Startup	Digital	Qualitative (multiple case study)	-
47	Hwang and Shin (2019)	Established company (large company)	Consumer electronics	Qualitative (single case study)	-
48	Iazzolino et al. (2020)	University (spin-off)	Diverse sectors (digital and non-digital)	Qualitative (multiple case study)	Lean Accelerator Canvas
49	York and Danes (2014)	Not defined. Comprising conceptual and theoretical works	Theoretical work	Conceptual/ Theoretical	-
50	York and York (2019)	Not defined. Comprising conceptual and theoretical works	Theoretical work	Other (SLR, interview)	-
51	York (2018)	Not defined. Comprising conceptual and theoretical works	Theoretical work	Conceptual/ Theoretical	-
52	York (2020)	Not defined. Comprising conceptual and theoretical works	Theoretical work	Conceptual/ Theoretical	-
53	Johnson et al. (2016)	Established company	Health	Qualitative (single case study)	-
54	Kaylan et al. (2021)	University	Education	Qualitative (single case study)	-
55	Khandros (2019)	Governmental	Local development	Qualitative (single case study)	-
56	König et al. (2019)	Startup	Diverse sectors (digital and non-digital)	Mixed (quantitative and qualitative)	-
57	Ladd and Kendall (2017)	Startup	Diverse sectors (digital and non-digital)	Quantitative	-
58	Lalic et al. (2012)	Startup	Diverse sectors (digital and non-digital)	Mixed (quantitative and qualitative)	-
59	Leal et al. (2021)	Established company (large company)	Electric power distribution	Qualitative (single case study)	-
60	Leatherbee and Katila (2020)	Startup	Advanced technologies across multiple sectors	Quantitative	-
61	Lichtenthaler (2020a)	Established company	Diverse sectors (digital and non-digital)	Conceptual/ Theoretical	-
62	Lichtenthaler (2020b)	Any type of organisation (established and startups)	Theoretical work	Conceptual/ Theoretical	-
63	Lindgren and Münch (2016)	Established company	Software	Qualitative (multiple case study)	-
64	Lizarelli et al. (2022)	Not defined. Comprising conceptual and theoretical works	Theoretical work	Other (SLR, interview)	-
65	Magistretti et al. (2019)	Established company (large company)	Consultancy	Qualitative (single case study)	-
66	Mansoori and Lackéus (2020)	Not defined. Comprising conceptual and theoretical works	Theoretical work	Conceptual/ Theoretical	-
67	Mansoori (2017)	Startup	Digital	Qualitative (single case study)	-
68	Mansoori et al. (2019)	Startup accelerator, business incubator, or science park	Startup accelerator	Qualitative (single case study)	-
69	Millán Vázquez de la Torre et al. (2019)	Any type of organisation (established and startups)	Tourism	Qualitative (single case study)	-

Appendix A: Summary Table of Papers Included in the Systematic Literature Review (Continued)

70	Miski (2014)	Not defined. Comprising conceptual and theoretical works	Software	Qualitative (single case study)	-
71	Moogk (2012)	Any type of organisation (established and startups)	Theoretical work	Conceptual/ Theoretical	-
72	Nashaat et al. (2019)	Established company	Digital	Qualitative (single case study)	M-Lean
73	Neubert (2017)	Startup	Advanced technologies across multiple sectors	Qualitative (multiple case study)	-
74	Neubert (2018)	Startup	Advanced technologies across multiple sectors	Qualitative (multiple case study)	-
75	Newbert et al. (2020)	Startup	Diverse sectors (digital and non-digital)	Quantitative	-
76	Nientied (2015)	Startup	Education	Qualitative (single case study)	-
77	Peralta, Echeveste, Lermen, et al. (2020)	Not defined. Comprising conceptual and theoretical works	Theoretical work	Conceptual/ Theoretical	Customer Value Measurement and Identification (CVMI)
78	Peralta, Echeveste, Martins, et al. (2020)	Startup	Agriculture	Qualitative (single case study)	-
79	Pillai et al. (2020)	Established company	Automotive	Quantitative	-
80	Popowska and Nalepa (2015)	Startup	Software	Qualitative (single case study)	-
81	Qin et al. (2020)	University	Education	Qualitative (single case study)	-
82	Racolța-Paina and Andrieș (2017)	Startup	Diverse sectors (digital and non-digital)	Qualitative (single case study)	-
83	Rasmussen and Petersen (2017)	Established company	Diverse sectors (digital and non-digital)	Qualitative (multiple case study)	-
84	Rasmussen and Tanev (2015)	Startup	Advanced technologies across multiple sectors	Conceptual/ Theoretical	-
85	Reis et al. (2019)	University	Education	Qualitative (single case study)	-
86	Reis et al. (2021)	Startup	Diverse sectors (digital and non-digital)	Conceptual/ Theoretical	Framework for generating a new startup concept
87	Robb et al. (2020)	University	Education	Quantitative	-
88	Rübling (2016)	Startup	Diverse sectors (digital and non-digital)	Mixed (quantitative and qualitative)	-
89	Scheuenstuhl et al. (2021)	Established company	Software	Quantitative	-
90	Schultz (2022)	University	Education	Quantitative	-
91	Schuurman and Protic (2018)	Startup	Living Labs	Conceptual/ Theoretical	-
92	Seggie et al. (2017)	Established company	Theoretical work	Conceptual/ Theoretical	Model combining Lean Startup and big data
93	Semcow and Morrison (2018)	University (research)	Social entrepreneurship	Qualitative (single case study)	-

Appendix A: Summary Table of Papers Included in the Systematic Literature Review (Continued)

94	Shanbhag and Pardede (2019)	Startup	Software	Conceptual/ Theoretical	-
95	Shepherd and Gruber (2021)	Not defined. Comprising conceptual and theoretical works	Theoretical work	Conceptual/ Theoretical	-
96	Shiradkar et al. (2021)	University	Education	Qualitative (single case study)	-
97	Silva et al. (2020)	Not defined. Comprising conceptual and theoretical works	Theoretical work	Other (SLR, interview)	-
98	Silva et al. (2021)	Startup	Biotechnology	Qualitative (multiple case study)	-
99	Sońta-Drączkowska and Mrożewski (2020)	Startup	Advanced technologies across multiple sectors	Qualitative (multiple case study)	-
100	Still (2017)	Startup accelerator, business incubator, or science park	Public research centres and universities	Qualitative (single case study)	Innovation Acceleration Model
101	Tanev (2017)	Startup	Advanced technologies across multiple sectors	Conceptual/ Theoretical	-
102	Tohanean and Weiss (2019)	Startup	Digital	Qualitative (single case study)	-
103	Traube et al. (2017)	Not defined. Comprising conceptual and theoretical works	Social work	Conceptual/ Theoretical	-
104	Uansa-ard and Wannamakok (2020)	University	Education	Quantitative	-
105	Vliet (2020)	Not defined. Comprising conceptual and theoretical works	Financial	Conceptual/ Theoretical	-
106	Weissbrod and Bocken (2017)	Established company	Clothing retail	Qualitative (single case study)	-
107	Welter et al. (2021)	Startup	Diverse sectors (digital and non-digital)	Quantitative	-
108	Xu and Koivumäki (2019)	Startup accelerator, business incubator, or science park	Digital	Qualitative (single case study)	-
109	Yaman et al. (2017)	Established company	Software	Qualitative (multiple case study)	-
110	Yang et al. (2019)	Any type of organisation (established and startups)	Libraries	Quantitative	-
111	Yordanova (2017)	Not defined. Comprising conceptual and theoretical works	Undefined sector	Quantitative	-
112	Yordanova (2018)	Not defined. Comprising conceptual and theoretical works	Undefined sector	Quantitative	-
113	Zijdemans and Tanev (2014)	Startup	Theoretical work	Conceptual/ Theoretical	-