administrative sciences

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Entrepreneurship and Innovation—Process Overlap or the Same? Systematic Overview and Converging Process-Dynamic Model

Piia Vettik-Leemet and Tõnis Mets *

School of Economics and Business Administration, University of Tartu, 51009 Tartu, Estonia; piia.vettik-leemet@ut.ee
* Correspondence: tonis.mets@ut.ee

Abstract: Recently, there has been increased discussion of entrepreneurship and innovation as process-based phenomena. However, research on the essence of dynamic entrepreneurial and innovation processes and their simultaneous interactions needs to be more cohesive and well-covered. This article critically reviews prior publications and explores the process approach to entrepreneurial and innovation processes. Structuration and equivalence theory, systems and design thinking, and pattern matching theory were implemented to structure and synthesise a converged operationalised dynamic process model. Exploring different approaches to entrepreneurial and innovation processes by screening 468 publications on entrepreneurship and 527 on innovation and a critical review of prior findings, the article identified only 17 and 13 dynamic process models, respectively. Six structurally comparable models covering both disciplines were selected for further analysis. Both disciplines' dynamic process models can be structured into five harmonised stages, which can partly be divided into (sub)phases. The article's primary contribution to the theory is systematically integrating process-based and design approaches in entrepreneurship and innovation. As a result, a streamlined and converged dynamic process model is developed, and the role of the process venue and the entrepreneur or innovator is discussed. As a practical implication, future directions for entrepreneurship and innovation educators, policymakers, and entrepreneurial/innovation ecosystem stakeholders are presented at the end of the article.

Keywords: entrepreneurship; innovation; innovation process; entrepreneurial process; dynamic process; structuration; artefact; innovative entrepreneurship; entrepreneurial innovation; entrepreneurial innovation journey

Citation: Vettik-Leemet, Piia, and Tõnis Mets. 2024. Entrepreneurship and Innovation—Process Overlap or the Same? Systematic Overview and Converging Process-Dynamic Model. *Administrative Sciences* 14: 38. https://doi.org/10.3390/admsci14020038

Received: 6 January 2024
Revised: 12 February 2024
Accepted: 16 February 2024
Published: 19 February 2024

1. Introduction

The interconnections between entrepreneurship and innovation have become particularly topical in recent years, examining their ties to economic growth (Audretsch 2004; Draghici and Albulescu 2014), national innovation capacity (Porter and Stern 2001; Draghici and Albulescu 2014; Proksch et al. 2017), and policy (Audretsch 2004). These fields, together with science and technology studies (STS), form the main knowledge base for the so-called "knowledge society" (Fagerberg et al. 2012). In the studies, there is some overlap between STS and innovation. There is a more significant commonality between entrepreneurship and innovation (ibid), though they are separate disciplines within the studies (Landström et al. 2015). Considering that one of the main features of entrepreneurship is the entrepreneurial process (Shane 2012), it is surprising that features common with the innovation process (see, e.g., Rothwell 1994) have not been systematically analysed.

Despite the broad interest in entrepreneurial and innovation process concepts, there is a gap in researching these processes as simultaneous dynamic phenomena as they are considered mostly isolated (e.g., Landström et al. 2015). However, these are often interconnected or intersecting processes with similar content and purpose. Determining mutual content compliance requires structuring these processes at the level of activities and means in a

timeline, that is, in dynamics. The dynamics of the processes are complicated by their non-linearity due to many feedback loops of different natures (e.g., Bhave 1994; Rothwell 1994), which are ignored or modestly taken into account in (investment) decision-making processes (see, e.g., Technology Readiness Level—TRL or Stage-Gate® models) (Cooper 2014, 2008; Phadke and Vyakarnam 2017). Understanding how the patterns of entrepreneurial and innovation processes fit together would allow these processes to be better managed. A similar problem arises in formulating entrepreneurship and innovation policies at the national level, where there are different policies and their integration (synchronisation) is modest (e.g., Audretsch 2004; Acs et al. 2014; Draghici and Albulescu 2014).

Therefore, perhaps in policy development, it is necessary not to separate innovation and entrepreneurship but to consider them as a single process, especially when discussing opportunity-driven, high-growth entrepreneurship. It may be necessary to radically change approaches to developing policies to support entrepreneurship and innovation and not separate them. Policymakers must shift their focus from implementing a mere collection of single policies for startups to designing a more holistic and interrelated 'entrepreneurship policy' approach (Acs et al. 2014). Institutions and infrastructure largely determine the ultimate outcomes of any policy intervention. Thus, they can leverage both a 'national system of entrepreneurship' and 'entrepreneurial ecosystems' to stimulate the innovative activity of new firms. Similarly, the 'national innovation system' and 'innovation ecosystems' policy interventions stimulate entrepreneurial processes in all organisations.

The synergistic effects of entrepreneurship and innovation have been reflected on a conceptual level without delving deeper into the process level (e.g., Zhao 2005; Maritz and Donovan 2013). The presence or absence of a synergistic relationship between entrepreneurship and innovation is not only a question of the respective policies and education content.

In education and training, the disciplines of entrepreneurship and innovation are handled differently. Entrepreneurship education is primarily targeted at startups for nascent entrepreneurs, whereas innovation education is primarily targeted at innovation processes for nascent innovators within an existing organisation. This point of view concludes that innovation and entrepreneurship are entirely different disciplines (Maritz and Donovan 2013). Kahn (2022) finds that universities mix too many entrepreneurship and innovation disciplines. At the same time, in the practice of innovative technology startups, both processes co-occur without distinguishing them from each other (see, e.g., Zhao 2005; Mets 2021). Hölzle (2022) calls for finding common ground between two interacting disciplines. Therefore, due to opposing views, the need arises to harmonise these two disciplines and respective processes for educational and practical purposes to prepare future entrepreneurs and startups for innovative entrepreneurship.

Very little research addresses these disciplines in a holistic, combined framework (Hölzle 2022). Bridging these gaps mentioned above means, among other things, analysis and synthesis of the base grassroots, that is, sub-processes and activity levels of these process phenomena from different perspectives.

This study aims to systematically review process-dynamic approaches in entrepreneurship and innovation studies and propose a streamlined entrepreneurial and innovation process model. As a result of the study, a converged operationalised entrepreneurial and innovation dynamic process model for nascent innovative (technology) startups/ventures is developed.

Through a topical review of current research and a clear conceptualisation of critical issues, the article addresses the following research tasks:

- Disclose perspectives and criteria for a systematic literature review of entrepreneurial and innovation process-dynamic models.
- Conduct a systematic literature review on the research on entrepreneurial and innovation dynamic process approaches.
- Analyse the concepts and models of the entrepreneurial and innovation dynamic processes.

- Disclose the similarities and differences between the entrepreneurial and innovation dynamic processes.
- Develop a streamlined operationalised model that converges the entrepreneurial and innovation dynamic processes.

The discussions above summarise that innovation and entrepreneurship are recognised to have some similarities but are not disclosed in detail. In fact, an entrepreneur (opportunity-driven and high growth-oriented) is an innovator. Innovation and entrepreneurial processes are both similar and inseparable. Thus, innovation should be included as an integral part of entrepreneurship process theory. This study combines two separate research streams of entrepreneurship[1] and innovation process[2] by directly connecting them through streamlining process models. According to the authors' knowledge, this study is the first attempt to systematically combine these simultaneous process models into a converged model for innovative (technology) ventures. Therefore, the present study helps to bring together entrepreneurship and innovation process research.

This article is organised into seven sections. Section 2 presents an overview of the theoretical foundation of entrepreneurial and innovation process-based models. Section 3 provides an overview of the methodology approach used. Section 4 presents results, findings, and analyses and introduces the theoretical foundation and the process-based model for entrepreneurial innovation developments. Section 5, with discussions and conclusions, summarises and critiques the findings. Finally, Sections 6 and 7 provide conclusions and recommendations for researchers, managers, and policymakers.

2. Theoretical Foundation

2.1. Entrepreneurship and Entrepreneurial Process

Entrepreneurship is about starting a business, creating a new venture, and developing business in established companies (e.g., Bhave 1994; Brem 2011; Davidsson 2016). Entrepreneurship generally studies how, why, and from what opportunities arise; how the intention and perceived opportunity lead to the opportunity; concept and business development; and venture[3] launch. The entrepreneurial process means all cognitive and behavioural steps from the initial conception of a rough business idea or first behaviour towards the realisation of a new business activity until the process is terminated or has led to an up-and-running business venture with regular sales (Shane and Venkataraman 2000; Davidsson 2005). The entrepreneurial process[4] contains ideas and opportunities as artefacts (Berglund et al. 2020) at the beginning, followed by stages, sub-stages, activities, and outputs-artefacts as input for the following stages (Mets 2022). There is a diversity of opinion when defining the terms "idea" and "opportunity" (e.g., Davidsson 2015; Berglund et al. 2020; Mets 2022). These two concepts are intuitively perceived by the entrepreneur within the variability of the entrepreneurial process. Therefore, entrepreneurial opportunity is an entrepreneur's ability to perform an entrepreneurial journey, transform an idea into specific results, bring an idea to life, and create new value.

New venture creation (NVC) is the most commonly used example of the entrepreneurial process (Davidsson and Gruenhagen 2021). This process is also described on the temporal scale as an entrepreneurial journey (McMullen and Dimov 2013; Mets 2022). Bhave's (1994) entrepreneurial process model starts with opportunity recognition, either externally (with the decision to start) or internally (with recognised need) stimulated. Therefore, the process models consider NVC and new product or service development. It implies that entrepreneurship is not limited to NVC but can be found in existing enterprises (Van der Veen and Wakkee 2004).

Entrepreneurial process models have developed and originated from process (narrative) and variance theory. The process theory approach explains the consecutive stages of the entrepreneurial process from initiation to launching the venture, product, or service (e.g., Bhave 1994). The variance theory uses models based on the static linkage of variables and is frequently targeted using statistical analysis (Moroz and Hindle 2012).

2.2. Innovation and the Innovation Process

Innovation is defined based on its type, process (models), sectoral aspects, and other factors, such as product, process, market, business model, and organisational innovation (Tidd et al. 2005; Wang et al. 2015; Cunningham and Walsh 2019). Innovation is regarded as implementing a new, significantly improved product (or service), process, new marketing method, or organisational method in venture practice (OECD 2005) that creates value for the customer. Innovation involves identifying, generating, and exploiting ideas oriented to the market, product/service development, and business creation. As a result of an innovation process, a product or service is brought to market, or a new venture is launched (Mudrak et al. 2005; Acklin 2010).

There is an extensive body of literature on innovation processes and models that describe the stages of the process, starting from the idea to the commercialised product (Mudrak et al. 2005; Galanakis 2006; Acklin 2010; among others). Galanakis (2006) summarised the development of innovation process models, starting from first generation models from the 1930s to seventh generation models in the present day. The development of models has been notable, from the simple linear sequential process with an emphasis on R&D and science (first generation) to an extended innovation network that combines network models and open innovation (seventh generation). In the current overview, we search for innovation process dynamic models that enable the integration of these approaches in the entrepreneurial context.

In summarising the initial theoretical overview, we can conclude that innovation process models are somewhat similar to entrepreneurial process models. However, their starting point is the society-level approach that links R&D investments to the development of the economy as a whole and progresses towards specific aspects of the company (market need and strategic aspects) (Rothwell 1994). Most venture-level innovation process models involve a pattern of the following steps or stages, starting from idea generation and identification, followed by concept development, evaluation, selection, development, and implementation (Galanakis 2006). Although most of the reviewed models have been described in different scopes of stages, activities, and other details, their essential process patterns remain largely the same.

2.3. Linking Entrepreneurial and Innovation Processes

Several authors have studied the linkage between innovation and entrepreneurship (Brazeal and Herbert 1999; Brem 2011; Autio et al. 2014). According to them, an entrepreneur is a filter that selects specific strategic (innovative) options and transforms them into commercialised outputs. This approach links entrepreneurship with innovation management. The process can originate from initial idea management, recognition and exploration of opportunities, idea development, commercialisation, and distribution, which can eventually be seen as a continuum between innovation and entrepreneurship. Entrepreneurial and innovation processes are co-occurring (Mets 2021). Brem (2011) found an ongoing shift from innovation to entrepreneurship within the evolution of the single process phases. Initially, the focus is on idea management, while entrepreneurship moves more into the spotlight as the process develops towards commercialisation and diffusion. Nevertheless, no single point can be identified at which innovation moves into entrepreneurship—it is a fuzzy and partly parallel-running process (Brem 2011).

As discussed above, entrepreneurship and innovation are both process phenomena. Both identify the product or service idea and the opportunity for its application. As a result of the process, a solution for satisfying some social need(s) is created. Both processes include sub-processes (stages) for validation and development of the concept, design, production, logistics preparation, and product launch (Brem 2011). The terms of these sub-processes and their sequence can be distinct in different approaches and disciplines, but the central construct contains the same components.

By developing previous assumptions, we argue that entrepreneurial and innovation processes can occur in an established or new venture (startup). The process is iteratively

feedback-driven, and the stages are usually repeated several times before reaching the market (Bhave 1994; Rothwell 1994). In this context, these processes are identical.

The interconnection between entrepreneurship and innovation manifests in many ways, creating synergy. Innovation requires entrepreneurial support to penetrate the market, while entrepreneurship thrives on introducing new and innovative solutions. Dalohoun et al. (2009) combined the insights that entrepreneurship can spur innovations, steer innovation processes, and compel the creation of an innovation-enabling environment. An understanding exists that entrepreneurs who do not innovate do not create wealth (Michael and Pearce 2009). This perspective closely intertwines with the synergy between entrepreneurship, innovation, and innovation processes. Zhao (2005) summarises the synergy between entrepreneurship and innovation in three aspects: complementarity, interaction, and strategic coherence. These circumstances again point to the need for a joint approach between the two process-based disciplines at the grassroots level.

2.4. Design Science Perspective in Entrepreneurship and Innovation Process

Sarasvathy (2003), based on the views of March (1982) and Simon (1996), called for attention to the design of artefacts within the entrepreneurial process. She means that it is about a limited number of things, a time horizon, and knowledge in conditions of uncertainty, depending on how the entrepreneur behaves. Thus, design thinking is the essence of entrepreneurship. Design science has been applied in many subsequent entrepreneurship studies (Google Scholar: 380 sources), mainly in the context of an entrepreneurial opportunity as an artefact (Berglund et al. 2020; Berglund and Glaser 2022; Magistretti et al. 2023; among others). There are significantly fewer holistic approaches to the entrepreneurial and design processes. An exception is Garcia et al. (2017), who present design and the entrepreneurial process as parallel and complementary. At the same time, most publications are limited to handling the opportunity in the initial phase of the process. Magistretti et al. (2023) use Google Ventures' Sprint methodology to broadly cover the topic, including opportunity defining, framing, experimenting, and learning.

Significantly (nearly 20 times) more publications link the design and innovation processes. Design thinking is seen as an accelerator of innovation (Cai et al. 2023) and innovation as a generator of technological artefacts (Desouza et al. 2007). This approach is summarised by the term 'innovation by design' (Wu 2013). Envisioning and experimentation with artefacts determine the boundaries of the innovation concept (Zasa and Buganza 2023). Park and Ramaprasad (2018) summarise the design and innovation process as co-creation.

The entrepreneurship or innovation publications of either discipline almost lack any discussion of the artefacts in the broader sense involved in the progression of these processes. Such artefacts include material, mental, affective, and cognitive artefacts (Piredda 2020; Heersmink 2021) created within the process. An exception is an approach to the entrepreneurial process, where the complete process is structured into sub-processes (stages), whose inputs–outputs are defined as artefacts that mark the progression of the process (Mets et al. 2019; Mets 2021, 2022). Thus, these studies are applications of the design science approach to entrepreneurship.

2.5. Understanding Dynamics in the Process

This study focuses extensively on the entrepreneurial and innovation processes and models that address their dynamics. These models have evolved from linear to more complex, feedback-driven iterative approaches (Rothwell 1992, 1994; Bhave 1994). In the context of iterative processes, it becomes essential to understand between which parts and how the feedback works. This aspect suggests the need to define the structure and dynamics of these two processes.

Aside from the discipline of physics, Merriam-Webster Dictionary (n.d.) defines "dynamics" as "a pattern or process of change, growth, or activity" and variation in force or intensity. Arend and Chen (2012) differentiate between static and dynamic processes.

We interpret the static process regularly taking place in the company, and the dynamic (entrepreneurial) process is somehow unique, transforming by progression. Entrepreneurial process dynamics manifest in time as a journey (McMullen and Dimov 2013) but can also become apparent in other dimensions (market scope, product maturity, financing, etc.). Several authors denote the concept of a journey as a timeline (Perry-Smith and Mannucci 2017) or a sequence (Rodriguez-Sanchez et al. 2019) of certain events. Mets (2022) defines the journey as the derivative of the process. That means the journey is a dynamic feature of the process. He developed the term 'entrepreneurial journey' from its metaphorical meaning to the measurable research concept/construct, the progression of what is marked by artefacts. The same is not reached in innovation studies where general schemas of the innovation journey elements remain unbound (e.g., Coyne and Van de Ven 2024).

Given the principle of reciprocity, the characteristics of the entrepreneurial process should apply to the innovation process. The need to understand the dynamics also results from the requirements to structure the entrepreneurial and innovation processes in the model and to take the following into account (Mets 2022):

- Non-linearity, feedback-driven, and the iterative nature of processes and their parts (stages-sub-processes);
- Dependence on various internal and external factors over time;
- The possibility and need for the construction/operationalisation of various (sub)process elements, metrics (markers, milestones, and artefacts), and dimensions;
- Harmony between the whole and the parts.

A process approach to applying these criteria is dynamic in nature. Consequently, based on the existing knowledge, the study's objectives are satisfied by models that apply the requirements above and enable the description of dynamic processes.

3. Methodology

3.1. General Approach and Interpretation of the Process Perspective in Models

A comparison of the processes of two closely related disciplines at the level of models requires some common platform to be based on. We chose a typical process approach in management practice, such as used in quality management, to bind both fields. The choice is based on common practice in management theory (e.g., Langley et al. 2013), which has been supplemented with the approaches above to entrepreneurship and innovation. In addressing process models, their textual and graphic descriptions are equally important.

When interpreting the models, the terminology and designations of sub-processes/activities, which differ by different authors, became problematic. The basis of the classic process approach is the so-called 'black box' of the process, which represents the operations/activities taking place with an entity/object, and the incoming-outgoing arrow represents the input–output—in the original and transformed form of the entity (Haberfellner et al. 2019). A process includes activities and procedures that may be repeated within a single process timeline. The more we know about the activities and procedures, the more the process becomes a 'white box'. Input–output entities (objects or/and states), in our understanding, are artefacts. According to nature (what is done with something), the name of the process contains the (generalised) name of the activity.

Many follow the event-driven approach (Van de Ven and Engleman 2004), indicating the process/activity with an arrow and the input–output with a box. Sometimes, the action name and the noun related to the entity's state are used interchangeably in the same model, that is, two graphical process description methods are mixed. In some model drawings, the process's feedback loop indicating the repeated process (part) is depicted as operating in a time scale that is not physically possible (there is no so-called 'time machine'), which indicates an underestimation of the timeline. Sometimes, the inputs–outputs are not shown directly on the flow chart of the model but are mentioned in the text of the article or are predictably derivable. These aspects complicate interpretation and accounting sub-processes, stages, and artefacts. As mentioned, we follow the first approach in our model-building (note 4). The process stages correspond to the criteria given in Section 3.2.

3.2. Selection of Sources for Analysis and Model-Building

An overview of the theory revealed a broad area for combining different perspectives in the entrepreneurship and innovation process-dynamic approach.

The primary criterion for selecting sources was the process approach and the completeness of the entrepreneurial or innovation process, that is, from initiating an idea or opportunity to reaching the market. Articles on models based on the theory of variables as being static were excluded, although we observed the structures and sub-process concepts used in them. We also excluded articles where the process consisted of only two stages as being too general and not explaining intraprocess transformations. Due to the same shortcomings, we also ruled out life cycle models.

The first perspective for the involvement of a literature source is the structuration of the whole process into smaller parts, allowing us to describe it as a sequence of feedback-driven sub-processes, procedures, and activities. In this step, the findings are synchronised with each other.

In most sources, there are no criteria for dividing the entrepreneurial or innovation process into stages. Therefore, stages and artefacts are aligned by following the requirements recently proposed by Mets (2022) as follows:

- The stage is the smallest complete and integrated process unit that involves mental and physical resources, activities/actions, acts, and feedback loops.
- Due to the activities and resources involved, the outcome is a new artefact and an input for the next stage.
- The stage is completed regarding its artefact, that is, after completion of the stage, its outcome (artefact) activates the next stage.
- Internal activities within the stage have a cyclical and (internal) feedback-driven character.

In some cases where the model contained many stages, we analysed whether they were self-contained according to the above criteria. It also turned out that, in some cases, a larger number of stages can essentially be reduced to a smaller number by combining interdependent activities following the criteria.

For the second perspective of the models to be analysed, we selected those that best corresponded to the dynamic process, that is, were structured and complex, contained (holistic) feedback loops, were iterative, contained a measurability scale (dimension), and presented time dependence. We selected the models that best met these conditions.

According to the formulation by Moroz and Hindle (2012), process dynamics "employs qualitative methods to examine how and why variations in context and process shape outcomes; it is often interpretive, temporal, and change-oriented". Initially, in aiming to gather information on variables that describe the substance of the process, the selection between static (variance approach) and dynamic (process approach) models was not performed automatically. Furthermore, the final selection of articles was made by inducing the following dynamic stage model characteristics (Mets 2022):

- Versatility of entrepreneurial (and innovation) process dimensions;
- Artefacts marking the progression of the entrepreneurial and innovation processes and leading idea-opportunity fit;
- Coherence between the entrepreneur-innovator, the entrepreneurship/innovation process, and society. The topic relates to the (process) ownership aspects and embeddedness of the entrepreneurial/innovation process;
- Continuity and interruptions within the entrepreneurial/innovation process trajectory;
- Objective and subjective metrics of the entrepreneurial/innovation process components (variables are partly dimensional as well as artefacts);
- Entrepreneur's competencies in recognising and implementing complex ideas and their means of implementation.

The above-mentioned criteria were fully implemented at the end of the publication selection. Critical content analysis was used to select sources to understand the content and structure of the entrepreneurial and innovation processes.

After selecting the articles, a comparative analysis was conducted using the process chart to understand the process models at their stage level. The process model components, such as stages, phases, activities, inputs, and outputs, were listed in the comparative table (below). Initially, entrepreneurship and innovation process models were synchronised and compared separately to understand the differences in stage level and manage the size of the datasheets. Afterwards, the datasheets were narrowed down according to the inclusion criteria. The tables were arranged accordingly.

Each process model was structured and analysed at the artefact level during the inquiry. The process models of entrepreneurship and innovation were compared at the stage, sub-stage/phase, activities, and input and output levels. Models with incomplete details were excluded.

3.3. General Approach—A Critical Review

Initial research about the entrepreneurship and innovation process revealed extensive but fragmented literature and the existence of studies in several disciplines and research areas. Entrepreneurship and innovation processes are addressed in different operational and temporal frameworks depending on the research discipline (entrepreneurship or innovation); therefore, these must be studied according to their conceptual and contextual level. Generalisations and sense-making vary according to the stages of the process. The same logic applies in the case of process models: the models can be about a particular section of the field or summarise the research field. This overview selects entrepreneurship and innovation process dynamic models for critical review. Several earlier reviews helped evaluate the results of our searches, including a list of literature on entrepreneurial (Hindle 2010; Moroz and Hindle 2012; Davidsson and Gruenhagen 2021) and innovation process studies (Rummel et al. 2022; Frankenberger et al. 2013), which does not mean that we agreed with all the categorisations given.

Business model innovation (BMI) models form a separate class, reviews of which (Wirtz and Daiser 2018) contain 20 or more articles. Although these have dynamic characteristics, and we included a few in our review, we abandoned their further analysis on this topic as being part of the entrepreneurial process (Mets et al. 2019). However, other innovation models are used by BMI analysis (Frankenberger et al. 2013; Rummel et al. 2022).

Articles in both disciplines may structure processes differently, use different terminology, and omit some self-evident features or parts of the process. Making sense of the models requires the use of different theories. These include structure and equivalence theory, systems thinking, and pattern matching theory (e.g., Trochim 1989; Galanakis 2006; McPhee et al. 2014; Desmet 2016; Solarino and Buckley 2023). Moreover, a design mode (e.g., Berglund 2021) is characteristic of this research. As an outcome, a streamlined process model is developed to describe the perceived notion of the processes.

We focused on the "entrepreneurship process model" and "innovation process model" during the literature research. Thus, we limited our review to journals and books on entrepreneurship and innovation. Journal articles and book chapters alone have been included in this research as validated knowledge. Book reviews and conference papers are excluded from this survey as they are not regarded as validated literature resources. Only one version is considered for duplicate model publications, although context in different papers is learned in the analysis. The first step of the analysis process is a keyword search in two primary databases, Scopus and Web of Science, and the Google Scholar (GS) search engine to gather relevant literature sources. The following query was launched in March 2021, completed in September 2021, and refreshed before the article's final version.

3.4. Search for Publications

Our task was to find publications that conceptually or operationally described the entrepreneurial or innovation process models and described the interaction of entrepreneurship and innovation using such keywords as "entrepreneurship AND process AND model"

or "entrepreneurship process model" and "innovation AND process AND model" or "innovation process model". During the search, using three keywords simultaneously did not give a clear overview of the topic, so different keyword combinations were used. Altogether, the authors used eight search terms, which were "entrepreneurship AND process OR model", "entrepreneurship AND process AND model", "entrepreneurship process model", "entrepreneurial innovation", "innovative entrepreneurship", "entrepreneurship AND innovation", "innovation AND process OR model", or "innovation AND process AND model". We searched for entrepreneurship and innovation process models containing information about the process models' stages, artefacts, and flow. On this basis, a selection of relevant articles was made. The period of 32 years was selected because it covers a wide range of articles and gives an overview of the evolution of entrepreneurship and innovation process models. Six inclusion criteria were used (Dziallas and Blind 2019). The inclusion criteria for entrepreneurship and innovation process literature were as follows (see also Figure 1):

- Availability in at least one of the above-mentioned databases;
- Including at least one of the keywords "entrepreneurship process" or "innovation process" in the title, keywords, abstract, or text;
- Only journal publications, books, and book chapters;
- Published between 1990 and 2022;
- Publications in English (hereafter, article, unless the publication form is emphasised);
- Publications considering entrepreneurship or innovation process models or descriptions.

The selection of literature sources took the following steps (Figure 1):

I. We studied 468 references on entrepreneurship process models and 527 on innovation process models.
II. After reviewing the titles and abstracts of each article and considering the inclusion and exclusion criteria, the number of articles decreased significantly to 103 and 254, respectively.
III. Next, we selected articles that included entrepreneurship and innovation processes as the topic of the main text; 63 and 75 sources, respectively, remained. Articles where the process concept appeared metaphorically or partially were omitted.
IV. We conducted a critical content analysis of the selected articles to understand the content and structure of the entrepreneurial and innovation processes, models, and related artefacts. At this stage, the stage models were selected. Here, 23 and 18 sources remained for feature analysis, respectively.
V. As a next step, we selected only dynamic stage models and analysed the process structure and artefact level. The process models were compared in stages, phases, activities, and inputs and outputs. After this selection, 17 and 13 articles remained, respectively.
VI. Finally, only dynamic, continuous, and embedded process models with more structured and comprehensive approaches to the process and process stages were selected for comparison (described in the findings). Among the latter, the models' most common/overlapping features' patterns are represented. The number of articles was reduced to six; three concerning each process model remained.

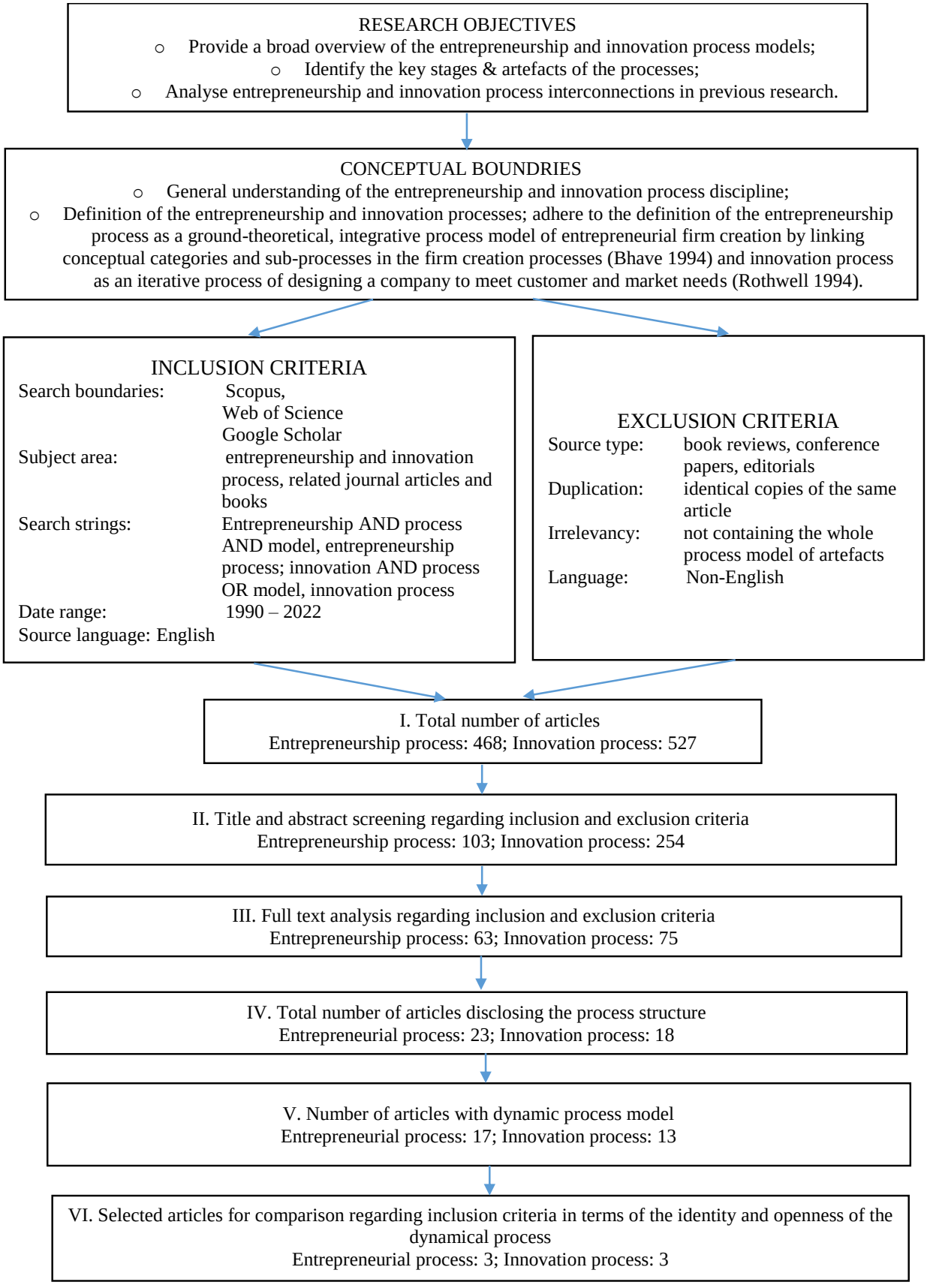

Figure 1. Flow diagram of the literature review (terms—see notes 1 and 2).

3.5. Mapping the Literature of the Entrepreneurial and Innovation Process Field

However, there were considerable differences in the approaches and conceptualisations in the literature. As mentioned above, we selected articles that contained dynamic process models. The final review included 23 articles and book chapters about entrepreneurial process models and 18 on innovation process models. (The sources are available in References, detailing the author(s), year of publication, title, and place.) Each article was analysed, and the process models were examined.

Table 1 shows the range of publications on entrepreneurial process models that were analysed in more detail for the final selection. The 23 articles on entrepreneurial process models primarily used qualitative methods (34.8%), mixed methods (26.1%), or theoretical articles (34.8%), with one example of quantitative methods (4.3%).

Table 1. Number of articles/chapters including entrepreneurial processes per source (included in the review, 1990–2022).

Sources	Number of Articles	% of Total Articles
Sustainability	3	13.0
Journal of Business Venturing	3	13.0
International Journal of Entrepreneurial Behavior & Research	1	4.3
Entrepreneurship Theory and Practice	2	8.7
International Journal of Entrepreneurship and Innovation Management	1	4.3
Revista de Estudios Empresariales	1	4.3
Small Business Economics	2	8.7
Small Enterprise Research	1	4.3
Academy of Management Review	1	4.3
Annual Review of progress in Entrepreneurship Research	1	4.3
Business Strategy and the Environment	1	4.3
Foundations and Trends® in Entrepreneurship	1	4.3
Journal of Global Entrepreneurship Research	1	4.3
New England Journal of Entrepreneurship	1	4.3
Book chapters	3	13.0

Table 2 presents the same data regarding the scientific articles representing the innovation process model. The articles on innovation process models used empirical (30.4%) or qualitative methods (26.1%), with some examples of mixed methods (4.3%) and theoretical articles (21.7%).

Table 2. Number of articles/chapters including innovation processes per source (included in the review, 1990–2022).

Sources	Number of Articles	% of Total Articles
European Journal of Innovation Management	1	5.6
Technovation	4	22.2
Design Management Journal	1	5.6
Current Issues in Tourism	1	5.6
Creativity and Innovation Management	1	5.6
International Journal of Entrepreneurship and Innovation Management	1	5.6
International Journal of Innovation Management	1	5.6
Engineering Management Journal	1	5.6
Facilities	1	5.6
International Marketing Review	1	5.6
Journal of Change Management	1	5.6
South African Journal of Industrial Engineering	1	5.6
Journal of Cleaner Production	1	5.6
Journal of Computer Information Systems	1	5.6
Journal of Product Innovation Management	1	5.6

We discovered that qualitative articles were frequent, though engagement with critical theory was limited and fragmented. This suggests the potential for greater engagement with theory and model development and an enhanced dialogue across the qualitative and quantitative divide.

3.6. Model Building

In addition to a critical literature analysis, a comprehensive methodological approach is needed to streamline the models. While developing the process model, practical experience and intuition have an essential role, but at the same time, intuition must be supported by adequate methods. Comparable and harmonised models do not correspond precisely to each other. Processes and sub-processes are divided into procedures, activities, and events, with corresponding objects and manipulations to match them. As a result, it is possible to identify and reconcile similar or identical elements of the models using the pattern-matching technique (see, e.g., Trochim 1989; Hyde 2000). The systems thinking approach (Galanakis 2006; Arnold and Wade 2015) is used to achieve the standard model structure, which includes:

- Identifying sub-processes, procedures, activities, artefacts, and tools and their linkages;
- Identifying feedback from within and outside of the process environment;
- Understanding the structure of the entire process;
- Distinguishing between process flows and variables;
- Identifying nonlinear and dynamic relationships;
- Reducing complexity with a systemic conceptual model;
- Understanding the whole system at different scales and scopes.

The result is a process structure, equivalent elements, and a streamlined model that replaces partial overlaps.

4. Results and Findings

4.1. Introduction to Findings

As we addressed above, entrepreneurship and innovation are process-based phenomena, and those processes are divided into different stages. However, no literature links the entrepreneurship and innovation process models in detail, as proposed in Section 3.2. The following discussion reviews preliminary findings from scientific literature and gives some critique of the results.

Based on the aim of the study, according to Section 3.1, the first identifiable feature of process models is their structure, and the second is the indicators of dynamics. According to this division, indicators of the entrepreneurial process have been identified based on the sources presented in Table 3, and the same is presented in the overview of innovation process models in Table 4.

Table 3 presents seven more frequently occurring features of the dynamic process in the studied models. Some of the features, although not named by the authors of the source, have been interpreted as possible undisclosed (U). Characteristics that were only a part of the first two (also, a single subsequent) models are process structuration (stage) criteria and process ownership (Mets 2022), journey, process and time metrics, embeddedness, and ecosystem. Although many articles mention the entrepreneurial process model (GS: 425 sources without citations), referring to other sources, only a few are focused on the original entrepreneurial process model, even less on dynamic models characterised by feedback (local and total) and iterations. The meaning of some model features was insignificant, and the interpretation was not unambiguous. They were excluded from further consideration as they were not influential in shaping the result. The characteristics of complexity and ecosystem (environment) were manifested in the models to varying degrees. Complexity is inherent in all feedback processes in uncertainty, partly from the environment. These circumstances are considered in the later summary of the models. We reached the same conclusions on innovation process models.

Table 3. Summary of entrepreneurial process features by process approach models from the early stage to reaching the market.

Source	Process Structuration		Process Dynamics				Link to Innovation	No. of Features	GS Citations	Comment
	No. of Stages	Artefacts	Feedback		Iteration					
			Local	Total	Local	Total				
(Mets 2022)	4 + 1 *	Y	Y	Y	Y	Y	Y	14 **	5	Stage criteria and ownership
(Mets et al. 2019)	4 + 1 *	Y	Y	Y	Y	Y	Y	12 **	18	Dynamic stage and journey model
(Vogel 2017)	3 + 1 *	Y/U	Y	Y	Y	Y	Y	7–9 **	260	Some features are partly disclosed
(Bhave 1994)	3(6 *)	U	Y	Y	Y	Y	Y	7	1712	Iterative model
(Vanevenhoven et al. 2011)	3	U	Y	Y	Y	Y	Y	7	94	Enabling bricolage
(Bloodgood et al. 2015)	4 + 1 *	Y	Y	Y	Y	Y	Y	7	85	Corporate e-p system dynamics
(Garcia et al. 2017)	4	U	Y		Y		Y	5	11	Parallel with the design process
(Cunneen and Mankelow 2007)	4	U	Y		Y			4	42	Training model
(Van der Veen and Wakkee 2004)	6	U	Y		Y			4	115	Conceptual model
(Foucrier and Wiek 2019)	5	U	Y		Y			4	39	
(Matzembacher et al. 2019)	5	U	Y		Y			4	32	Sustainability model
(Belz and Binder 2017)	6	U	Y		Y			4	720	Aligning the bottom lines
(Masoomi et al. 2022)	4	U	Y		Y			4	2	
(Lopez et al. 2019)	5		Y		Y		Y	4	3	
(Leyden and Link 2015)	4		Y		Y		Y	4	118	
(Qian et al. 2018)	8	U					Y	3	35	
(Galanakis and Giourka 2017)	4	U						3	81	Systems thinking, including factors' complexity
(Bygrave 2004)	4	U					Y	3	641	
(Cornelissen and Clarke 2010)	5	U						2	762	Linear model
(Shane 2003)	7	U						2	7603	Linear model
(Baron 2007)	3	U						2	1306	
(Brazeal and Herbert 1999)	3		Y		Y			3	698	
(Jack and Anderson 2002)	3					Y		3	2044	Embeddedness

Notes: * Our interpretation; Y—yes; U—an undisclosed form of the feature; ** Additional features: process structuration/stage criterion, process ownership, journey as a derivative of process, process and time metrics, embeddedness, and ecosystem; GS citations: 5 February 2024.

Table 4. Summary of innovation process features by process approach models from the early stage to reaching the market.

Source	Process Structuration		Process Dynamics				Link to e–p	No. of Features	GS Citations	Comment
	No. of Stages	Artefacts	Feedback		Iterations					
			Local	Total	Local	Total				
(Rothwell 1994)	5	U	Y	Y	Y	Y		6	3431	Interactive model
(Brem 2011)	6	U	U	Y	U	Y	Y	7	129	(Corporate) Entrepreneurship
(Rodriguez-Sanchez et al. 2019)	3	U	Y	Y	Y	Y	Y	7	64	Complicated diagram, term: 'journey', tourism
(Acklin 2010)	4	Y	Y	Y	Y		Y	6	136	SME
(Cooper 2008)	5	U	Y	Y	Y	Y		6	2284	Stage-Gate NPD model
(Cormican and O'Sullivan 2004)	5	Y	Y	Y	Y	Y		6	646	Signals from the environment
(Schoen et al. 2005)	4	Y	Y	Y	Y	Y		6	92	The main process is covered by 2 stages
(Pynnönen et al. 2012)	4	U	Y	Y	Y	Y	Y	7	130	Customer-driven bus-model innovation
(Voelpel et al. 2004)	4	U	Y	Y	Y	Y	Y	7	515	Bus-model innovation
(Assink 2006)	4	U	Y		Y		Y	5	1074	Learning cycle-based model
(Brown et al. 2021)	5	U	Y	Y			Y	5	117	
(Acklin 2013)	4 + 1 *	Y	Y	Y			Y	5	148	SME
(Louw et al. 2018)	7	U	Y	Y				4	25	
(Galanakis 2006)	4	U	Y		Y?			4	522	Systems thinking, including complexity and no clear process
(Bernstein and Singh 2006)	4	U		U				3	229	Integrated linear model, biotech
(Ram et al. 2016)	4–10	U					Y	3	10	Software system innovation
(Salerno et al. 2015)	4–7	U					Y	3	398	Considering a possible stoppage
(Mudrak et al. 2005)	5	U						2	99	Organisation environment

Notes: * Our interpretation; Y—yes; U—an undisclosed form of the feature; GS citations: 5 February 2024.

A good question is always what spawns the process: an idea or an opportunity. Several authors signal the start of the entrepreneurship or innovation process as when the entrepreneur or innovator decides to commence the process (e.g., Bhave 1994). Following Bhave's (1994) entrepreneurship process model, the decision to start (in the case of the creation of a new venture) or need to be recognised (in the case of intrapreneurship) comes before the idea and opportunity. On the other hand, several authors of the entrepreneurial process start with opportunity recognition (Jack and Anderson 2002; Cunneen and Mankelow 2007) or an initial idea (Van der Veen and Wakkee 2004; Davidsson 2005). Others begin with a (starting) intention (Bhave 1994; Mets et al. 2019) that does not depend on a triggering opportunity or idea. In the case of an innovation process, the division is similar: idea-opportunity identification (Cumming 1998; Acklin 2010, etc.) or decision to innovate (Mudrak et al. 2005; Tidd et al. 2005). From the process perspective, entrepreneurship is contextualised on opportunities, whereas innovation is contextualised on the innovation process, from idea generation through product development to commercialisation (Maritz and Donovan 2013). Therefore, there is no common ground about the starting point of the process, and this notion needs to be specified.

There are several different approaches to entrepreneurship and innovation processes. Some processes are described in detail, while others are too general. For example, Shane's (2003) entrepreneurship process is linear and does not give an overview of the artefacts and stage outcomes. At the same time, there are some more open and explained process flows (Bhave 1994; Van der Veen and Wakkee 2004; Acklin 2010; Mets et al. 2019). The stress here is on explaining process stages and artefacts—what is needed for the stage, what happens during the stage (activities), and the outcomes as inputs into the next stage. As we can see from the previous findings, there is some space to elaborate on both processes.

4.2. Process Models for Entrepreneurship and Innovation

Model selection is a multifaceted process. Although Tables 3 and 4 present the models' features, they are not equally open in the articles. We also could not proceed from the representativeness of journals or the citation of articles; this would have significantly reduced the number of possible features for analysis. In addition to many common features, the first two articles of Table 3 are devoted to the measurability of the entrepreneurial process—structuring and progression (stages and artefacts, time dimension, and journey)—and several influencing factors (Table 3, footer). At the same time, many descriptions of the same author's model in different articles overlapped and did not provide new information in terms of characteristics. For some authors, for example, Vogel (2017) and Bhave (1994), the processes' structuring and the details of the process approach differed. For completeness, we preferred the latter. The decisive factor in the selection was the completeness of the process approach aspect.

After reviewing the literature and analysing and comparing the process models, six articles that followed the criteria outlined in Sections 3.1 and 3.2 were selected. Three are about entrepreneurial process models, and three are about innovation process models. Of course, this choice has an inevitable subjectivity on the authors' part. Selected models described the occurring processes most appropriately (Table 3). Entrepreneurial process models originate from Bhave (1994), Bloodgood et al. (2015), and Mets et al. (2019).

Bhave's (1994) process model reviews the twofold process: idea-opportunity development can occur both in existing and creation phase ventures. The Bloodgood et al. (2015) model opens up a multifactorial system-dynamic (corporate) entrepreneurial process. Mets et al.'s (2019) approach was selected due to its explicit description of process stages and artefacts, while at the same time considering the dual initial phase and iterative nature of the entrepreneurial process (Bhave 1994) and its effect on entrepreneurial decision-making (Sarasvathy 2001). The variables characterising the individual stages of the process are prioritised. They are viewed as stored in a single Silo in the proximity of the entrepreneur. Mets et al. (2019) open up the model in more detail.

Examples of innovation processes originate from Rothwell (1994), Cooper (2008), and Acklin (2010). In an initial comparison, we see a substantial similarity between Mets et al.'s (2019) and Rothwell's (1994) "coupling" (third generation) models implemented for the venture context. These models were chosen for further analysis because of their process approach and improvements in line with the "coupling" model, including the next-generation and causal loop models (Galanakis 2006).

The innovation and entrepreneurial path models of Galanakis (2006) and Galanakis and Giourka (2017) require additional pattern analysis. The detailed treatment of causal loop diagrams and many (but not exhaustive) factors/variables/linkages with different levels of generalisation in both models raises the question of whether all the linkages between variables have been considered. This question concerns, among other things, feedback loops. However, these causal and feedback loops may operate continuously, only once or not at all. The entire process model concept requires a sufficient generalisation that can be verified based on exact circumstances. When choosing another criterion, we generally move towards a dynamic approach, which maintains the process's progression via sub-processes (i.e., the state of the process) and the dimension of time—the view of the journey.

Both criteria are met by Mets et al.'s (2019) entrepreneurial process model, the main features of which are presented in Table 3. Sub-processes' input–output and linkages by stages, presented in causal loop diagrams (Galanakis 2006; Galanakis and Giourka 2017), do not meet these criteria, despite presenting many detailed variables. In addition, these models do not follow the traditional process approach (see note 4) and are therefore omitted.

Cooper's (2008), Acklin's (2010), and Rothwell's (1994, 1992) models have similar process structures, but outcomes-artefacts are formulated differently. Rothwell (1994) includes the results of the in-house research, and Acklin's (2010) approach offers design elements to the process. Cooper's (2008) Stage-Gate model, augmented with feedback loops, fits well into this set. The selected process models are compared below.

4.3. Streamlining Process Models

The main problem was the choice of models to harmonise the processes of the two disciplines. The initial selection was based on Tables 3 and 4, which include models reached within the search. Models originate from articles with different purposes, and the models' structure and the descriptions' thoroughness depend on it. The second, fourth, and sixth sources were chosen for the entrepreneurial process. Interdependent models were excluded. The first, fourth, and fifth models of the innovation process were selected. The selection was made mainly by trying to match the structure and elements' patterns.

Comparing the definitions of the entrepreneurial and innovation processes reveals the primary similarities in venture creation vs. implementation of the innovation in the existing organisation, feedback from the customer/market, and business notions (strategies, technologies, and structures). The main differences appear in the process's embeddedness: inside the existing firm or moving towards creating a new one. A preliminary comparison data of the process models is given in Table 5.

Analysing the schemas of the process models, we noticed that most did not pay attention to the storage of (prior) knowledge and other resources as a proposition for the process and part of the overall process. Shane (2000) draws attention to the importance of prior knowledge from the entrepreneurial process's opportunity identification point of view. Similarly, Bloodgood et al. (2015) have entrepreneurial insight as an initial phase and proposition for the process.

Most models do not consider the embeddedness of the process in the so-called Silo in the entrepreneur/innovator's proximity organisation[5]. As the propositions change/improve during the process, Silo is also in dynamic change (Mets 2022).

Table 5. Comparison of the entrepreneurial and innovation processes and composition of the streamlined process model.

Entrepreneurial Process			Streamlined Process Concept	Innovation Process		
(Bloodgood et al. 2015)	(Bhave 1994)	(Mets et al. 2019)		(Rothwell 1994)	(Cooper 2008)	(Acklin 2010)
Entrepreneurial insight	-	**Proposition stage** Prior capabilities Intention (outcome) Perceived opportunity (outcome)	**Idea-opportunity proposition and identification stage** Phase 0. Propositions Phase 1. Idea—opportunity recognition Outcome: Perceived idea-opportunity Outcome: Intention to start	-	-	-
Opportunity recognition Opportunities (outcome)	**Opportunity stage** Phase 1. Decision to start Phase 2. Opportunities recognised Opportunity filtration (outcome) Phase 3. Opportunity chosen Opportunity refinement (outcome) Phase 4. Business concept identified			**Idea-generation stage** Market(ing) input	**New product idea** Defined customer Refined idea (outcome)	**Idea-generation stage** Phase 1. Evaluate impulses from the market and organisation Innovation hypothesis (outcome) Phase 2. Market, technology, and customer needs Innovation strategy (outcome)
Opportunity assessment Sufficient opportunities (outcome)		**Idea development stage** Creativity and social assets New venture idea (outcome) Filtered opportunity (outcome)	**Opportunity selection and development stage** Phase 2. Idea—opportunity selection; Phase 3. Idea—opportunity development Outcome: Filtered idea—opportunity; New product/venture idea—opportunity selected	**R&D, design, and (product) development**	**Development stage** 1-st prototype Alpha-tests Initial design (outcome)	**Idea selection stage** Phase 3. Idea selection Product/service strategy (outcome) Phase 4. Observational/Experimental research Design criteria, product requirements (outcome)
Opportunity legitimation Legitimate opportunities (outcome)	**Technology setup and organisation creation stage** Phase 5. Commitment to physical creation Phase 6. Organisation created and Production Technology Phase 7. Product	**Concept development stage** IP and resources business model Business concepts (outcome) Opportunity confidence (outcome)	**Concept development stage** Phase 4. Concept development and design Outcome: Idea—opportunity confidence; Business concept	**Prototype production** Prototype	**Prototyping** Final prototype Full tests Manufacturing process	**Concept development stage** Phase 5. Concept development and design Prototypes (outcome) Phase 6. Concept evaluation and user testing Customer feedback (outcome)
Opportunity implementation		**Business development stage** Strategy and Resources Team Venture launch (outcome)	**Business development stage** Phase 5. Technological solution Phase 6. Business preparations Outcome: Venture launch	**Production, engineering** Parts manufacturing (suppliers)	**Field trials** Customer site Feedback	
	Business operations and sales stage Phase 8. Customer/Market	Opportunity exploitation (outcome)	**Business operations and sales stage** Phase 7. Implementation Outcome: Customer/market; customer experience	**Manufacturing, Marketing and sales** (Exploitation stage)	**Launch** Operation Post-Launch	**Implementation (stage)** Phase 7. Implementation and commercialisation Value proposition (outcome) Phase 8. Coordination of brand, communication, and product services Customer experience (outcome)
Implemented opportunities (outcome)						

The benefit of applying Rothwell's (1992, 1994) third-generation innovation process model is that it essentially combines the following models partly derived from it. An interactive scheme can explain sub-process integration into the environment/network and their partially parallel occurrence (the model's fifth generation). Also, in Bhave's (1994) and Acklin's (2010) models, the stages are more structured into phases, which supports further comparison and streamlining of the models (Table 6).

Observing the stages of the selected entrepreneurial and innovation processes, we can see their similar structural patterns. There are minor differences in the activity titles and outcomes, but the overall stages are in place. Substantive differences appear at the end of the processes, where different approaches and authors use different terms to describe the implementation of the opportunity. Idea-opportunity commercialisation or market success is used in the case of the innovation process approach (Rothwell 1992; Acklin 2010) and the entrepreneurial process (Van der Veen and Wakkee 2004; Cunneen and Mankelow 2007).

A new venture launch is typical in entrepreneurial process descriptions (Bhave 1994; Mets et al. 2019). The difference in this notion may lie in the environment where the process occurs: is it an NVC 'idea-opportunity', or is it a very new 'idea-opportunity' or innovative solution inside the existing venture? Therefore, we adopt Bhave's (1994) approach, where the new 'idea-opportunity' can occur inside the existing venture (intrapreneurship and innovation) or be the basis for the NVC.

4.4. Converged Process Model Structure

Next, the stages, phases, and outcomes of the converged process model are described in Table 6. In the explanations, we also reference other sources that supplement the content.

4.4.1. Propositions and Idea-Opportunity Identification Stage

The idea-opportunity identification stage begins with phase 0. Proposition(s) storage. This phase contains the prior resources, knowledge, motivation, and capabilities of entrepreneurs/innovators (Mets et al. 2019). Prior knowledge, skills, and experiences stored in the entrepreneur's proximity are essential in the entrepreneurial process (e.g., Bhave 1994; Shane 2000; Mets et al. 2019). Phase 0 of storage of knowledge and other resources is replenished (accumulated) during the main process and affects intermediate and final outputs (Shane 2000; Keupp and Gassmann 2009). This preliminary phase gives prior preparedness and gives an introduction to phase 1.

Idea-opportunity recognition/generation follow as the next phase. At the beginning of this phase, several new and potentially profitable ideas are generated, and opportunities are identified. At this stage, information about the problems, competitors, market, technologies, and strategies is essential. As an outcome, the collected perceived ideas-opportunities are managed, and the most promising ones are identified and moved into the next stage of the process—the intention to start.

4.4.2. Idea-Opportunity Selection and Development Stage

All the identified ideas and opportunities undergo (re)shaping during the Idea-Opportunity selection phase. All the ideas and (perceived) opportunities are estimated and filtered based on initial market research. Only the most promising ideas and opportunities are selected to proceed.

Selected ideas and opportunities move to the Idea-Opportunity development phase, and the best plan for their implementation is chosen. The initial idea-opportunity development, preliminary evaluation, situational analysis, and thorough market and technological research are conducted. At the end of this phase, the idea-opportunity concept is identified. The selected idea-opportunity is revised and filtered, and a new product/venture idea is created as an outcome of this stage.

Table 6. Streamlined converged process model for entrepreneurship and innovation.

Stage	Propositions and Idea-Opportunity Identification	Idea-Opportunity Selection and Development	Concept Development	Business Development	Business Operations and Sales
Phase	0. Proposition(s) storage 1. Idea-opportunity recognition	2. Idea-opportunity selection 3. Idea-opportunity development	4. Concept development and design	5. Technological application 6. Business preparations	7. Implementation
Activity	Accumulation: 0.1 (Prior) Knowledge 0.2 Motivation 0.3 Skills and capabilities 1.1 Idea-opportunity generation 1.2 Evaluation of ideas-opportunities and impulses from market 1.3 Innovation management	2.1 Idea-opportunity selection based on initial market research 3.1 Initial idea-opportunity development 3.2 Preliminary idea-opportunity evaluation (personal and commercial)	4.1 Development of the idea-opportunity concept 4.2 Prototyping 4.3 User testing 4.4 Initial funding and resources 4.5 Intellectual property (IP) analysis 4.6 Business model design	5.1 Testing and validation 5.2 Technological and design preparations for production 6.1 Detailed project/business planning 6.2 Development and management of the innovation/product 6.3 Human resources: hiring and training 6.4 Production process 6.5 Logistics: preparation 6.6 Marketing 6.7 Protection of IP rights 6.8 Strategy 6.9 Funding	7.1 Updating the business plan with appendixes 7.2 Production/service offering 7.3 Sales 7.4 Receiving Customers' strategic and operational feedback 7.5 Funding secured
Out-come	Prior preparedness	Ideas-opportunities (identified) Market needs (recognised) Refined idea-opportunity Identified idea-opportunity concept Selected idea-opportunity Idea-opportunity fit	List of prospective innovations/products Preliminary prototype/market feedback Initial funding	Tested and validated innovation/product Design Refined business plan and strategy Protected IP Technological and production infrastructure readiness for production	Value proposition Customer experience Customer/market
Input artefact (to the next stage)	Perceived idea-opportunity Intention to start	Filtered idea-opportunity New product/venture idea-opportunity (selected)	Business concept Idea-opportunity confidence	Venture launch	Re-innovation

4.4.3. Concept Development Stage

During this stage, the idea-opportunity concept is developed and validated, an initial prototype is formed, and the product/service is introduced to the selected market, forming relevant outcomes (Table 6). The phase requires understanding the perceived market need, attainable resources (Van der Veen and Wakkee 2004), ecosystem feedback, and support (Mets et al. 2019). As a result, the opportunity confidence is reached. Possible iterative feedback loops from the following stages for concept refinement and evaluation can occur at this stage. Idea-opportunity confidence and business concept are inputs into the business development stage.

4.4.4. Business Development Stage

The business development stage entails technological and business preparations. In the fifth phase, the technological solution is tested and validated. After successfully validating the technological solution, preparations for production are ready. The next phase, business preparations, involves adjusting the business plan with more detailed marketing, manufacturing, operational distribution plans, and IP (intellectual property) strategies. This stage entails all preparation activities for the new product or service provision and venture launch.

4.4.5. Business Operations and Sales Stage

Activities like a detailed business plan with marketing and competitive analysis, sales prognosis, and the strategic plan will be completed at the start of the last stage. Business operations and sales, that is, opportunity implementation, are taking place. This stage has iterative feedback loops to previous stages. Further actions could be re-innovation (Rothwell and Gardiner 1988) or going back within the previous stages and changing the innovation object/product according to customer/market needs.

Entrepreneurial or innovation ecosystems influence the process, entrepreneur(s)/innovator(s) own knowledge, experiences, and internal environment of the venture team (Mets et al. 2019).

5. Discussion

This paper conducted a critical systematic literature review and analysis of the entrepreneurial and innovation processes. As a result, a streamlined converged process model was developed, integrating the concepts of dynamic stage process models, considering their slight variability. Differences begin to appear when viewing the process through the lenses of either entrepreneurship or innovation. In both approaches, the process begins with recognising the idea and/or the opportunity. In the initial phase, neither feature has yet been clearly defined. They evolve in the learning process of the entrepreneur-innovator, both reciprocally and in terms of environmental and resource impacts. In order to streamline the approaches to the two process variants, we recommend using a combined construct of ideas and opportunities to denote them. Thus, "idea-opportunity" as a composite construct characterises the beginning of both processes.

The following findings are generalised from a group of models (Tables 5 and 6), which do not necessarily mean validity for all entrepreneurial and innovation processes. Therefore, concluding remarks are also observations that require a more comprehensive, more targeted study in the context of the already proposed generalised models.

The entrepreneurial and innovation process models are similar at the starting point, where managerial actions focus on idea-opportunity identification, selection, and development. The different approaches of the process models begin with idea-opportunity generation or the decision to start a venture or innovate—in effect, which means the main context depends precisely on that. The pursuit of idea-opportunity is central to both process-based approaches. The process models are identical; the slight differences emphasise idea-opportunity development, funding, and commercialisation management. Therefore, the first conclusion is:

C1. *The dynamic models of the entrepreneurial and innovation processes are compatible.*

Entrepreneurial and innovation processes aim to implement an 'idea-opportunity' in the market, that is, placing a product or service on the market and meeting the customer's needs. The exact structure and pattern are similar throughout the process. It manifests in the substantive overlap of functional (sub)processes, where the differences are mainly due to the general approach of the specific study—furthermore, the causal input–output relationship between individual processes, from idea-opportunity identification to implementation meeting real customer needs. Finally, feedback throughout the process chain is the same, both from the environment in general, from a specific customer segment in particular, and from the (sub)process to the previous one. The second conclusion is:

C2. *Entrepreneurial and innovation process models are inherently structured at the same level of components.*

The stages of entrepreneurship and innovation are connected with idea-opportunity recognition, selection, and development; concept and design; business development; business operations and sales. The main differences in approaches may appear in the idea-opportunity identification stage, especially in the proposition stage, where initial conditions such as skills, experiences, and physical infrastructure are crucial. The embeddedness of process coordination, ownership, and tangible and intangible resources can only sometimes distinguish the entrepreneurship and innovation process. The embeddedness of the process coordination is revealed when the startup builds up its internal functions or the operating company already has (some) structures for running (innovation and/or intrapreneurship) the process to some extent. Consequently, the development of a corporation may be path-dependent and less innovative, and a spinoff company with a strong resemblance to a startup may be used to implement breakthrough innovation. Also, process ownership is embedded in the startup entrepreneur and his/her team. Usually (but not always), ownership/responsibility are more decentralised in the case of in-house entrepreneurship or innovation.

The research confirmed Brem's (2011) finding that these processes co-occur. The entrepreneurial and innovation process models have the same stages, phases, and activities. The processes occur simultaneously but potentially with some temporal scale and intensity differences: there is an ongoing shift in emphasis from entrepreneurship to innovation and vice versa. From this, we can draw the following conclusions:

C3. *The elements of the entrepreneurial and innovation processes are identical and intersect.*

C4. *The venture creation process within innovative entrepreneurship is both an entrepreneurial and an innovation process.*

In conclusion, the entrepreneurial and innovation processes form an entrepreneurial innovation process with the same stages creating the same artefacts. Consequently:

C5. *The same artefacts mark the progression of the entrepreneurial and innovation processes.*

Using progression milestones, artefacts enable the traceability and measurability of the innovation journey. Considering the feedback-driven pattern of the entrepreneurial innovation process, the journey's progression is perceived until it reaches the market, and an opportunity implementation becomes a reality. Similarly to the entrepreneurial journey (Mets 2022), that also means that:

C6. *The progression trajectory—entrepreneurial innovation journey—is identical for the entrepreneurial and innovation processes.*

Entrepreneurial and innovation processes take place inside the entrepreneurial/innovation ecosystem. The ecosystem contains support mechanisms for nascent and corporate ventures, assembling different participants from universities, public sector institutions, and enterprises. The entrepreneurial/innovation ecosystem support is very

relevant at the idea-opportunity stage, paired with previous experiences, capabilities, and knowledge. Therefore, the seventh conclusion is the following:

C7. *The entrepreneurial and innovation processes have a common (entrepreneurial) ecosystem environment.*

Finally, a startup usually has fewer resources—more learning is required to carry out the process and acquire tangible and intangible (i.e., a workforce with functional skills) resources. The process is the same, but the differences in interpretation come from the discipline. Usually, according to the literature on innovation processes, the process occurs in established ventures with better environmental and financial conditions and necessary human resources. The same applies in the case of some spinoffs of more prominent companies. In the case of a startup, the skills, experiences, and physical conditions of the individual or team might be more limited.

The focus (outcome) of the entrepreneurial process is usually NVC and randomly the commercialisation or market launch (exception, e.g., Bhave 1994). On the other hand, innovation processes are realised through commercialisation or a market launch (Acklin 2010). Summarising the above, we can state that the synergy of entrepreneurship and innovation largely results from the unity of the processes.

We do not deny that the nature of the process, from idea-opportunity to implementation, depending on the framework, can be more similar to either entrepreneurship or innovation. In the case of innovation process models, a company has usually already created its business structure. However, the entrepreneurial process starts with idea-opportunity identification, where the business structure of the new venture or branch is in the creation phase. At the same time, there is a possibility that the business structure is also in the creation phase during the innovation process.

6. Conclusions

This study presents a systematic literature overview of entrepreneurship and innovation process models. Entrepreneurial and innovation process models have traditionally been treated as separate phenomena, depending on the type of activity, sector, venture, innovation, and other variables. The article's main contribution to the theory of entrepreneurship and innovation is systematically integrating process-based approaches into these two disciplines. As a result of the literature review, we composed a streamlined converged process model and demonstrated seven key conclusions that await empirical confirmation. At the same time, our study provided an opportunity to describe the harmonised process as an entrepreneurial innovation process or an innovative entrepreneurial process.

The article contributes particularly to the entrepreneurial and innovation process structuration and progression assessment, implementing a design thinking approach. With the development of the converged model, the prerequisites are created for addressing entrepreneurial innovation processes in dynamics—as a journey from inception to reaching the market. That means the opportunity to replace the journey's metaphorical meaning with a research construct in an operationalised form.

We point out the need to understand the nature of process progression and corresponding stages, activities, and artefacts as outputs and inputs into the following stages within the process. Understanding the structure and logic of the innovation and entrepreneurship process has theoretical and practical implications. Artefacts marking milestones of the progression of the entrepreneurial (innovation) process, as disclosed above, have a dual meaning—objective and subjective as perceived by an entrepreneur/innovator/stakeholders (Mets 2022). Whether the perceived progression is real can only be confirmed when the innovation reaches the market. This approach also creates a prerequisite for a better understanding of the trajectory of TRL or Stage-Gate® model assessment within different projects—how feedback processes can affect it.

Although entrepreneurship and innovation are based on the same overlapping, identical process, the goals, means, and methods of implementing new ideas may remain distinct

between these disciplines. It was also confirmed that innovation is not necessarily entrepreneurship (Kahn 2022) but instead is a unique function of entrepreneurship (Drucker 2002) and the potential source of the synergy of innovative (startup) entrepreneurship.

The review revealed that there is no common ground about the starting point of the process—the question remains whether there was an idea or opportunity for starting or a decision to start. In the case of the streamlined converged process model concept, we recommend using a combined construct of idea and opportunity. Thus, the idea-opportunity as a composite construct characterises the beginning of both processes.

The results of this study can be used for a better understanding of the synchronicity of process models and the directions of their future research. Focusing on the stages and activities one by one within a streamlined process may provide a better understanding of the needs of nascent and active ventures. A better understanding of the structure of the processes and the logic of the operation of the whole and its parts allows us to forecast their dynamics, as well as the upcoming opportunities and needs of the venture. These notions allow entrepreneurial/innovation ecosystem stakeholders to provide better timing and targeting support for novice and active entrepreneurs. The results also offer future directions for entrepreneurship and innovation educators and policymakers. For startups, it offers a better understanding of the simultaneously occurring processes and their artefacts and an understanding that entrepreneurship and innovation are in constant change. In addition, the notion is that the entrepreneurial and innovation process models are the same but with contextual differences. Consequently, future research will enable educators and policymakers to improve and merge the entrepreneurship and innovation policy and its support mechanisms. This research offers the foundation for further research on dynamic entrepreneurial and innovation process models, frameworks, and approaches.

7. Limitations and Future Research

This article only harmonises the approach to entrepreneurship and innovation processes. A deeper cognitive and philosophical view that links processes and possible synergies is still waiting. That would mean opening the 'black box' of the process and sub-processes simultaneously from the point of view of both disciplines. From the point of view of the entrepreneurial process, there are some examples (McMullen and Dimov 2013; Mets 2022). Linking the entrepreneurial process with the general approach to the innovation process (Rothwell 1994) should be complemented by time-dependent (journey) trajectories with decision-making models (Cooper 2014; Phadke and Vyakarnam 2017).

A limitation of this study is the theoretical modelling, which leaves room for further theory development, case studies, and other practical implications. Another limitation is that the publication sample is based on a limited number of keywords and publications. The model can be tested in the context of articles we did not use directly for its synthesis. One such area may be intrapreneurship (in-house entrepreneurship), which we did not address directly (e.g., McFadzean et al. 2005; Bloodgood et al. 2015). The in-house entrepreneurship and innovation concepts are probably even more similar than those in the venture creation process.

The attempt to streamline entrepreneurial and innovation processes has shown that structuring and researching the entrepreneurial process as a whole has the potential for research within individual stages. As shown in Table 6, the individual stages can, in turn, be divided into sub-stages/phases. The following theoretical and empirical studies are expected to meet the criteria of an independent stage (Mets 2022) and a deeper structure within the stage.

The process model and conclusions generalised by this article require future empirical research and testing of their applicability in real life to understand the model's full potential. The dynamic process model contains the contributions of several authors to entrepreneurial or innovation process investigations. There is the possibility that some of the artefacts may be interpreted differently from previous studies.

Comparative real-time evaluations and case studies are recommended to examine the developed converged process model and its artefacts in different (technology) sectoral contexts. One essential perspective is applying the created model to the theoretical and empirical studies of the derivative of the converged process—the entrepreneurial innovation journey as a manifestation of this dynamic phenomenon. Future research could validate the converged process model for larger established companies, small and medium-sized ventures, and startups in various sectors.

Author Contributions: Conceptualisation, T.M. and P.V.-L.; methodology, T.M. and P.V.-L.; validation, P.V.-L. and T.M.; formal analysis, P.V.-L. and T.M.; investigation, P.V.-L. and T.M.; data curation, P.V.-L. and T.M.; writing—original draft preparation, P.V.-L. and T.M.; writing—review and editing, P.V.-L. and T.M.; visualisation, P.V.-L. and T.M.; supervision, T.M.; project administration, T.M. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data are contained within the article.

Conflicts of Interest: The authors declare no conflicts of interest.

Notes

1 In this article, the term "entrepreneurial process" is used primarily as a research construct, and the term "entrepreneurship process" is a process that characterises the discipline in particular. The latter term is also used in the text when it is used in the original cited source.

2 The term "innovation process" is used here at the venture level if the context does not open up another aspect, for example, at the societal level.

3 The authors define venture as an organised (economic) activity through which entrepreneurs offer products or services (based on Davidsson 2023). Depending on the context, the term describes entrepreneurship in both new (startup) and existing businesses (intrapreneurship and corporate entrepreneurship).

4 The traditional process model guides the article (e.g., Haberfellner et al. 2019).

5 The exception here is Mets et al. (2019), who, extending the cited sources (Shane 2000; Jack and Anderson 2002), bring these aspects into the process approach.

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