A Process-Based Model of New Venture Creation: Toward Modelling a Practical Application of Extant Theory using SADT Diagrams

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Abstract
Although the field of entrepreneurship abounds in studies attempting to explain the creation of new ventures from an array of theoretical perspectives, the answer to the critical question regarding "*how*" the process unfolds over time remains unsolved. The main goal of this paper is to demonstrate the importance of integrating an engineering point of view with the new business creation process in order to find the answer. This study will dig deeper into the issue by proposing the use of SADT (Structured Analysis and Design Technique) for modelling the "road map" that could assist entrepreneurs in dealing with uncertainties in a systematic and comprehensive way.

Keywords:
Venture Creation Process, Theory, Models, Practical Focus, Modelling, SADT

1 INTRODUCTION

Although the entrepreneurship field abounds in studies attempting to explain the creation of new ventures from an array of theoretical perspectives [1], the answer to the critical question regarding *"how"* the process unfolds over time remains unsolved [2]. To date, the entrepreneurial process has lacked a "road map" that could assist would-be entrepreneurs going through the proverbial "black box" between required inputs and desired outcomes [3] and dealing with the uncertainties which surround any new business creation [4].

According to Tötterman [5], the different ways to describe entrepreneurial processes originated from specific fields and each one of them has broadly strived to answer a set to four questions regarding the entrepreneur: The functional approach *(what)* derive from economics, the approaches focusing on the individual *(why and who)* from human sciences and the approaches on the processes *(how)* from management and organization sciences (Figure 1).

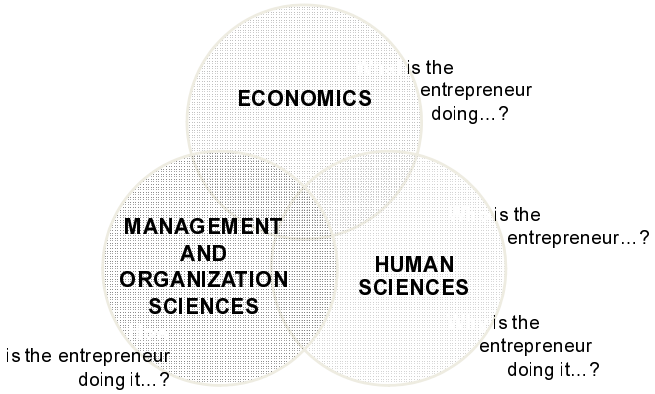

Figure 1. Theoretical contributions to the entrepreneurial process literature by different disciplines.

Consequently, if we make a logical link between our first statement of the unanswered question of *"how"* and the field that is in charge of finding the right answer, in this case Management and Organization Sciences, the result will be that the discipline is failing to do its job. Given the multidisciplinary nature of entrepreneurship theory, this fact uncovers the urgent need to introduce a new approach that could bring greater clarity about the absolute fundamental issues of entrepreneurship: what goes in, what comes out and how the transformation takes place [6].

Traditional pioneering studies that explore venture creation processes have used different terminology to describe the temporal sequences of events or activities that occur as entrepreneurs create a new organization. For example, Reynolds and Miller [7] prefers to use the term "Gestation process" which he defines as *the moment between the principals elect to initiate a new firm and the new firm participates in the economy.* Ultimately, the extant literature represents a great number of heterogeneous models whose key components demonstrate little uniformity other than patterns related to the life cycle stages (such as pre-venture, birth, growth, death) and only a few of them aimed at providing practical implications that address the "how" of entrepreneurship [6].

As a result of the above statement, the biggest challenge now is to explore the process with a pragmatic focus and empirically theorize from the ground of practice, which implies that scholars need to stop drawing conceptual models that describe the different stages and major issues related to the venture creation process using variance theory methods and qualitative case studies [1]. In this sense, built on the assumption that researchers must re-engage in open minded efforts at laying a foundation upon which extant work in the field of entrepreneurship may be successfully integrated [8, 9

cited in 6], it might be possible that the key path to fulfill today's challenge could come from a different field. A field that uses different methodologies and tools and that will help us to integrate propositions from previous studies into a synthetic and applicable process-based model. Which science could hold the key to developing a process-oriented model capable of being used by entrepreneurs as a "road map" in a real basis, formalized in a logical pathway that can be followed, and that additionally proposes tools and controls to minimize the risks of looping fundamental data at each step of process?

In sum, a serious research gap exists regarding the process, methodology and tools for new business creation. The purpose of this study is to evaluate published and peer-reviewed models of entrepreneurial processes in order to discover key components; establish clear links or relationships between them; determine tools or criteria to go from one activity to another; and find out whether if the study states practical implications or venture creation evidence by using the proposed model. Hence, this paper synthesizes research from a practitioner perspective and uncovers the importance of understanding the interrelationships between activities and the need for a well structured process model that prevent entrepreneurs from finding themselves repeating actions that could lead them to lose time and resources through the process of starting their own business.

This paper is structured as follows. Section 2 outlines the scope of relevant literature and attempts to provide a comprehensive theoretical view on differences among the extant models of the venture creation process. Section 3 discusses the gaps in the literature and identifies engineering sciences as the holder of the answer to the *"how"* question in entrepreneurship theory. Section 3 also considers the modelization of the process using SADT(Structured Analysis and Design Technique) as an option to synthesize and operationalize the process. The paper concludes with suggestions for future research studies.

2 LITERATURE REVIEW ON NEW VENTURE CREATION PROCESS MODELS

We start by defining the field of entrepreneurship as a scholarly examination of how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated and exploited [10]. Based on this definition, we establish that the central activity in entrepreneurship is the formation of new organizations. In this sense, all the functions, activities and actions associated with perceiving opportunities and creating organizations to pursue them, are denominated as the entrepreneurial process [11].

Only recently, attention has been given to the events involved in new business creation [7, 12, 13]. Different studies have attempted to explain it from an array of theoretical perspectives, such as economics [14], psychology [15, 16], population ecology [17, 18], ethics [19], Strategic management [20], Marketing [21], among others.

During the past few years several researchers [2, 6, 22, 23, 24, 25] have called for more process-driven research in order to better understand dynamic organizational processes. However, extant process-based models are far from being homogenous and a variety of alternative classifications may be done depending on the variables taken into account. For example, Tötterman [5] makes a classification of 22 scholars and their models based on a two-perspective view: Process models focusing on entrepreneurial opportunities and those that are focused on new entrepreneurial behaviour (Table 1).

Entrepreneurial opportunities process models: These models are focused on the process by which new goods, services, raw materials, markets and organizing methods can be introduced through the formation of new means, ends, or means-ends relationships. Then, the author makes a further classification into three differing opportunity perspectives: Allocative process view, Discovery process view and the Creative process view.
Entrepreneurial behavior process models: They focus on entrepreneurs as individuals and the activities undertaken by those individuals. The behavioral approach argues that it is central for entrepreneurship research to study what entrepreneurial individuals actually do and what they actually create when they shape new venture ideas.

Table 1. Taxonomy of entrepreneurial process models based on Tötterman [5].

On the other hand, we have the recent work done by Hindle and Moroz [6], where they develop a taxonomic matrix of entrepreneurial process models; then, a classification of 32 peer-reviewed journal publications and scholarly books published in the last forty years was done. Different from the two perspectives used by Tötterman [5], this study builds up the classification on four main types of entrepreneurial process models: Stage Model, Static Framework, Process Dynamics and Quantification Sequences (Table 2).

Stage model: divide into a priori stages major tasks or phases; One major weakness is that they tend to narrow the scope of investigation and that temporal orders of events do not fit the proposed stages and/or often overlap.
Static framework: characterizes the overall process of venture creation without examining the sequence of activities, consists of a limited set of variables connected by speculative causal links; process oriented but do not capture sequence of dynamics
Process dynamics: employs qualitative methods to examine how and why variations in context and process shape outcomes; often interpretive, temporal and change oriented
Quantification sequences: is a historical sequence based approach of the new venture creation process; this approach does not allow researchers to understand the dynamics of how antecedent conditions shape the present and the emergent future within the process

Table 2. Taxonomy of Entrepreneurial Process Models [6]

In addition, the authors [6] point out that there were only 7 models that explicitly stated practical implications for the research conducted: Bygrave [26], Carter et al. [27], Corbett [28], Cuneen and Mankelow [29], Fayolle [30], Sarasvathy [31], Spinelli et al. [32]. Based on the overview of extant models indentified by Hindle and Moroz [6], we now focus on the special characteristics of the 7 studies (Table 3).

Author	Type of Model	Key Components/ Events/Stages/Domains	Variables/Factors/Actions
[26]	Stage Model (4)	Innovation, Triggering Event, Implementation, Growth	Personal, sociological, environment, organizational
[27]	Quant ification sequence	Up and running, Still trying; Given up	Bought equipment, got financial support, developed prototypes, organized start-up team, devoted full time, asked for funding, invested own money, looked for facilities, equipment, applied license/patent, saved money to invest, prepared plan, formed legal entity, hire employees, rented facilities /equipment, had sales, positive cash flow, credit listing, EI, FICA, filed tax
[28]	Stage Model	Discovery, formation	Preparation (deliberate, unintended), Incubation, Insight (eureka, problem solved, idea shared), Evaluation (recursive), Elaboration
[29]	Stage Model (4)	Opportunity recognition; opportunity evaluation; opportunity development; opportunity commercialization	Creative activity, innovative activity, strategic activity; Preliminary evaluation (personal, commercial), detailed situational analysis, formulation of mission and objectives, entry strategy, feasibility analysis, and BP, resources search, operational plans, implementation plans, secure funding.
[30]	Stage Model (2)	TRIGGER PHASE Act of new venture creation not perceived, perceived, considered, desired, COMMITMENT PHASE started, completed, perceived, refused.	Displacements, perceptions of desirability (culture, family peers, colleagues, mentors), perceptions of feasibility (financial support, other support, demonstration effect, models, mentors, partners), commitment; resource acquisition, integrating networks, structuring emerging organizations
[31]	Process dynamic	Inputs,effectual strategy: outputs:	What I know, who I am, whom I know, environment, constraints, expectations Design, Means, Partnership, Affordable loss, Leverage contingencies, Can. Financial performance, Product, firm, or market artefacts created, Increase in social welfare, Change in the process by which things are done
[33]	Static Frame work	Opportunity, Resources, Entrepreneurial Team	Creativity, Communication, Leadership, Founder, Business plan (fits and gaps)

Table 3. Characteristics of the 7 models that explicitly stated practical implications [6].

Finally, from this section we can conclude that, even though the literature is extensive in information about the stages and key activities in the process of starting a new business, there is not yet a dynamic method that could integrate all the stages/event/activities and help the nascent entrepreneur in dealing with the concrete actions that must be done from the idea in their head to the consolidation and further evolution of the new business.

3 DISCUSSION

3.1 Gaps in the literature

It is clear that the majority of extant literature focuses only on the theorizing power of business creation process models and there is an imminent need to explore other perspectives and alternatives that researchers in entrepreneurship have been neglecting.

In that respect, the following statement made by Van de Ven [3] is unequivocal and indicative: "…An appreciation of the temporal sequence of activities in developing and implementing new ideas is fundamental to the management of entrepreneurship, because entrepreneurs need to know more than the input factors required to achieve desired outcomes. They are centrally responsible for directing the innovating process with the proverbial "black box" between inputs and outcomes. To do this, the entrepreneur needs a "road map" indicating how and why the innovating journey unfolds, and the paths that are likely to lead to success or failure…"

Given the above, researchers should give considerable interest to developing a venture creation model that integrates all dimensions of the process to become a real "road map" that fills the gaps left by scientific literature.

On the other hand, we have more recent studies like those of Liao et al. [34] that conclude that firm gestation is a complex, nonlinear process, rather than a simple, unitary accumulation of sequential events in which the developmental stages are hardly identifiable. In this sense, what they are suggesting us is to think that the process is so complex and ambiguous that planned actions may not lead to desired responses.

Similarly, we can take for instance the innovation process and all its different theories, models, principles, methodologies, and so on. In a practical ground, what reality has shown, is that one of the major impediments in the innovation process is the belief that invention cannot be systematic and be based on scientific principles [35].

In addition, most of the scientific studies are fragmented, descriptive, and focused only on a few aspects of the new venture creation process. More importantly, most of the literature has not paid adequate attention to the needs of the entrepreneur - the main beneficiary of the model. Nor has the literature placed proposed methodologies of the models in practice.

3.2 Bridging the gaps in the literature: A call to action for engineering sciences and SADT modelling

According to Bygrave [33], entrepreneurship research has emerged by using methods and theories from other sciences, but in order to become a distinct discipline it needs to develop its own methods and theories. On the contrary, based on the gaps found in the literature - notably the need for pragmatic research and empirical evidence - and the recent studies that outline the urgent need to develop a harmonized model of entrepreneurial process capable of embracing the best of what is on offer and adding new theoretical arguments in areas where practice shows that they are lacking [6], this study believes that engineering sciences may hold the key to resolving the limitations of current process-based models.

Subsequently, due to the ineffectiveness of existing models the engineering perspective might respond - as the starting point – by engaging in the use of a modelling language that respects the following requirements on the basis of the literature review:

- It must be able to model complex and dynamic systems.
- It must be able to focus on elements of the system without losing the links to the whole model.
- It must provide a common language to describe and model all aspects of the system.
- It must be compatible with existing ideas and principles in economics, management and organizations and human sciences.
- The resulting model must provide a normative statement about the way in which the venture creation process should be structured and should operate.
- It must allow the formalization of functional interactions and the identification of information flow.
- It must integrate rigor and control in the process of analysis and a method for using the modelling language.

As a result, based on these requirements, and a review of modelling methods and languages that have been developed so as to model business processes [36] - SADT, IDEF3, BPMN, FBSPPRE-, we have chosen the use of SADT since it not only describes the tasks involved in a project and their interactions, but also describes the system that the project aims to explore, create or modify, highlighting the different parts that constitute the system, their purpose, their operation and the interfaces between the various parts which let us see the system as more than a mere collection of independent elements [37].

Each SADT diagram is composed of boxes (representing activities) connected by arrows (representing flows of materials, data, or information) and provides a robust structured method to model hierarchical systems [38]. SADT models are composed of *Inputs* (needed data), *Outputs* (produced data), *Controls* (commands that influence the execution of the activity) and *Mechanisms* (means, components or tools used to accomplish the activity), and uses several hierarchical blocks (Figure 2). The A0 block is the top-level, which presents the overall system. This block can be broken down into lower levels in order to describe the subsystems, or in other words, the parts that make up the overall system.

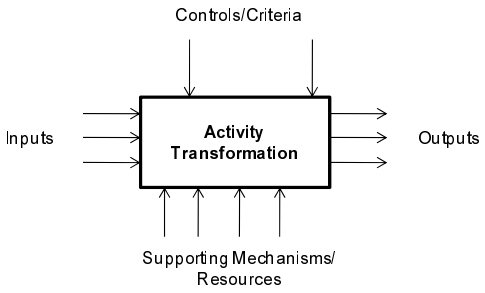

Figure 2. Syntax of SADT diagrams.

3.3 The elements of the model

For instance, taking into account that the use of SADT lets us focus on specific parts of the process without losing their relationship to other parts, and at the same time we are able to make links to other field's principles like management, organizations and economics, we cannot be deaf, dumb and blind to what the market has to offer regarding the best-selling phrase: "How to start your own business".

In this sense, nascent founders have to face the challenge of searching among millions of books or internet links that offers the "magic recipe" on "How to start your own business", and more certainly if they ask for advice on how to increase a venture success, a likely response is "Start planning", given the fact that universities around the globe teach students in numerous entrepreneurship classes about the importance of preparing business plans and how to write them. Store bookshelves abound with books on how to prepare a business plan [39] and 10 million business plans are written each year worldwide [40]. But, what if that is not really a requirement or the "answer" for success? After all, some of our role models today, such as Bill Gates (Microsoft), Steve Jobs (Apple), Michael Dell (Dell), and Sergey Brin and Larry Page (Google), did NOT have business plans in hand when they started their companies.

On the other hand, regarding the content of the business plan, there is a plethora of books, consultancy services, do-it-yourself software, government support agencies and universities that explains how to write this document, typically suggesting that business planning is valuable and important for new firms [41-45]; but whose number of chapters and methods varies from one to another. However, and most important, all of them present a common factor that, as Gruber's research findings clearly indicate: *"Handbooks typically focus on the content of business plans (and neglect the process), and offer a fairly standard, "one-size-fits-all" notion of planning"* [46].

In sum, what we can retain from the literature regarding the business plans is that it does not present a complete process for new venture creation and instead the different sections or chapters resemble bits or pieces of processes without neither a clear connection between them, nor a logical pathway to follow. Indeed, this is manly the reason why entrepreneurs find themselves repeating actions and information through the business creation process.

According to Van de Ven and Poole [47] and Aldrich [18], process theories generally have distinct sequences and mechanisms which explain how and why various changes occur and why certain processes progress. In just the same way, entrepreneurs organize new firms through a series of actions and they are undertaken to different degrees, in different order, and at different points in time [48].

To date, Delmar and Shane [49] have been among the first researchers to emphasize that by engaging in different patterns of activities, firm founders will create variation in the firm formation process. Then, in order to understand how this variation occurs, we have to first focus on the characteristics defining the evolution of the process, and second on the purpose of the different activities in which firm founders can engage.

Moreover, there are four different characteristics that dictate how the patterns of activities evolve [49]:

- First, not all activities are necessary for the founding team to perform.
- Second, due to the firm founders' limited cognitive capacity, they lack the ability to undertake all organizing activities simultaneously.
- Third, the ability to undertake some activities is dependent on or will be enhanced by the completion of other activities.
- Fourth, some activities are more important early in the history of new venture, others are more important later in the life history of the new organization.

Most important, this study distinguishes two (2) different types of activities: Planning and Operational activities [49]. Planning activities refers to events that coordinate different activities at the early stage of venture creation; and Operating activities can be in turn divided into legitimacy building activities, resource transformation activities and market-related activities.

Finally, in line with the idea of developing a categorization of the different types of activities involved in the business creation process, this paper proposes a more comprehensive classification that basically distinguishes 3 types of activities: Product/Service; Market; and People and Operations activities.

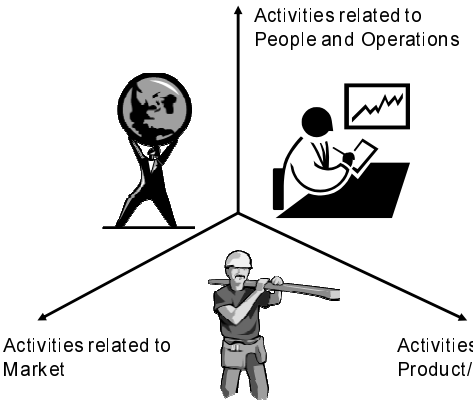

Figure 3. General graphical representation of the 3-Axis.

Having reviewed the literature in section 2 and based on the discussion presented in Section 3, a descriptive model of the new venture creation process is proposed as a linkage between theory and practice in the entrepreneurship field. This model represents a concrete contribution from engineering science to help answering the question of ***How*** the process unfolds over time.

The detailed process-based model using SADT diagrams is not presented here, since it is the subject of an entire paper in progress at the present time; however, we present a partial graphical representation for illustrating our approach (Figure 4).

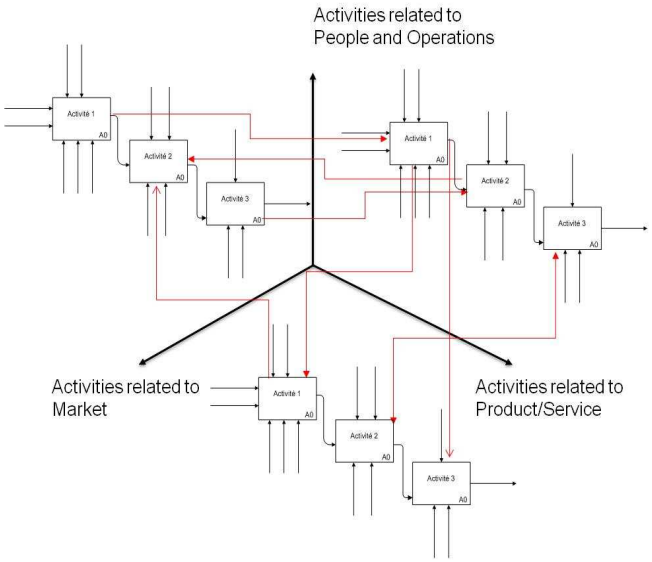

Figure 4. Partial graphical representation of the SADT model for illustrating our approach.

4 CONCLUSIONS AND PERSPECTIVES

With the ever growing infant mortality of Small and Medium Sized Enterprises (SMEs) around the world, whereas only 40% to 50 % of firms created in a given year survive beyond the seventh year [50], the contributions made by economics, management and organizations and human sciences have shown their limits as approaches to help and assist the entrepreneurs in starting their own business. One of the main contributions of our study is to have highlighted the lack of practical implication of existing models of business creation and to have identified the potential of engineering sciences as a highly valuable contributor to the domain. To some extent, our analysis offers new perspectives for the normative literature and for practitioners.

We have also proposed SADT modelling to represent the "road map" in which the venture creation process should be structured and should operate. Moreover, the formalization of functional interactions and the identification of information flow inside the process will become the key element to avoid repetitive actions and/or analysis that lead entrepreneurs to lose time and resources through the process and that eventually affect the chances of success.

Finally, our model highlights major opportunities for future research to explore potential use of our 3-axis framework regarding activities related to the integration of products/services, markets, people and operations. Furthermore, in a short term, our model will be tested by a group of engineering students involved in a business creation course run by author's laboratory in Arts et Métiers ParisTech to make a preliminary assessment to discover the strengths of our model and to point out uncovered areas.

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