Dean&Francis
ISSN 2959-6130

Effectuation or Prediction? Dynamic Blends of Entrepreneurial Decision Logics under Knightian Uncertainty

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Abstract:

Entrepreneurs typically operate within a context characterized not only by high uncertainty but also by an environment where planning rooted in predictive reasoning may not always be the most effective. This paper examines two diametrically opposed logics in entrepreneurship-related decision-making, specifically causal (or predictive) strategies and effectuation. It draws on Knight's (1921) theories of uncertainty and effectuation theory, formulated by Sara V. Saravathy in 2001. The analysis compares the applicability of planning as a mechanism for achieving predetermined goals with effectuation throughout the entrepreneurial process. It investigates two empirical case studies in entrepreneurship to explore how effectuation operates during the early stages of ventures such as Airbnb. Conversely, Tesla offers insights into a hybrid approach integrating predetermined outcome planning and effectuation. The findings imply that both methods are applicable at distinct stages of an entrepreneurial venture's growth.

Keywords: Entrepreneurship; Knightian uncertainty; Effectuation theory; Causal logic; Predictive logic; Means orientation

1. Introduction

Uncertainty is a challenge that every entrepreneur confronts. Unlike established companies, new ventures lack established structures or clear market positioning and have uncertain futures. Thus, uncertainty plays a pivotal role in the success or failure of entrepreneurial ventures [1]. Traditional business theory recommends the utilization of predictive logic in goal-setting and detailed planning to anticipate market behavior [2]. This strategy proves less applicable during the initial phases of venture creation[1]. Scholars generally believe that in a highly uncertain environment, strategies relying on prediction and detailed planning struggle to effectively address the unique challenges in the early-stage entrepreneurial process. Traditional business theory emphasizes achieving predetermined results (i.e., causal logic) through establishing clear goals, conducting market forecasting, and optimizing resource allocation. This

ISSN 2959-6130

approach functions effectively in a stable environment, but its core assumptions (such as market predictability and resource availability) often fail to hold in the early stages of entrepreneurship. Sarasvathy (2001) noted that causal logic relies on the "prediction-execution" model, which requires entrepreneurs to possess adequate information and controllable conditions that are often lacking in the venture launch phase [3]. The development of effectuation theory has challenged this traditional paradigm. This theory draws on an empirical study of 45 experienced entrepreneurs and emphasizes that entrepreneurs should start from existing means (such as personal skills, network resources and limited capital), control risks through the principle of "affordable loss", and create opportunities by leveraging unexpected events rather than pursuing the maximization of expected gains [3].

However, existing research has not yet adequately addressed the interaction between structural inequality and the influence of digital technologies on decision-making logic. The specific deficiencies are evident in the following aspects: Much of the literature centers on short-term cases (such as displaced groups or specific industries), with few cross-cultural or cross-industry comparative studies, making it difficult to verify the generalizability of the theory. In terms of argumentation, scholars often emphasizes the universality of "uncertainty", but neglect its typological differences (such as the distinction between Knightian uncertainty and market fluctuations), resulting in an imprecise critiques of causal logic[1].

This paper focuses on exploring how entrepreneurial decisions between predictive logic and effectual logic are made under uncertain situations. The specific research question is:

(1) In the highly uncertain early stage of entrepreneurship, how does effectual reasoning, compared with causal prediction logic, help entrepreneurs create opportunities and mitigate risks through its core principles (such as means orientation, affordable loss, and strategic alliances)?

(2) As startup enterprises gradually develop and encounter different growth stages and types of uncertainties, how does their dominant decision-making logic evolve from effectual reasoning and/or dynamically integrate with causal logic?

(3) In real entrepreneurial contexts, is there a hybrid decision-making model? If so, how do enterprises (e.g., Tesla) balance and implement these two seemingly opposing logics in practice to tackle multi-level challenges?

Airbnb is a typical case that exemplifies the efficacy of effectual logic in the early stages of entrepreneurship. It perfectly embodies the principles of "means orientation" and "affordable loss" and is highly suitable for analyzing how effectual reasoning fosters innovative business models under high uncertainty. Tesla, by contrast, employs effectual reasoning while upholding causal logic in its overall mission and supply chain development (including a clear long-term strategic vision).

In terms of theoretical contributions, this study challenges the dualism that treats causal logic and effectual reasoning as mutually exclusive. It reveals that the applicability of decision-making logic is not static but evolves systematically with the development of firm resources, environmental uncertainties and strategic tasks, thereby providing theoretical support for developing a more context-sensitive entrepreneurial decision-making model.

2. Theoretical Basis: from Knight's Uncertainty to Sarasvathy's Effectual Logic

The evolution of entrepreneurial decision-making theory under uncertainty represents a significant shift from defining the problem to developing actionable solutions[1]. As early as 1921, economist Frank Knight drew a fundamental distinction between "risk" and "uncertainty". He noted that risk can be quantifiable, such as the probability of accidents that can be estimated by statistics, while uncertainty is inherently unforecastable, such as whether a new product will gain market acceptance [4]. Decades after Knight proposed this theory, Sarasvathy formulated effectuation theory, which seeks to explain how entrepreneurs make decisions in uncertain environments. She found that, unlike the causal logic of "defining goals first and then allocating resources" in traditional business planning, many successful entrepreneurs begin with available resources and incrementally explore possibilities based on their existing capabilities, networks, and knowledge.

A key challenge in the process of entrepreneurial decision-making lies in addressing uncertainty. This distinction is of great significance to entrepreneurship research, as entrepreneurs frequently make decisions in the absence of reference data or clear pathways. Effectuation, by contrast, emphasises adaptive responses to dynamic realities, prioritises experimentation and collaboration throughout the process, and focuses on affordable failure costs rather than profit maximisation[2, 5, 6].

Effectuation Theory's logic is not a set of arbitrary empirical rules, but an internally consistent behavioral framework consisting of four core principles. The first is the principle of mean orientation. Contrary to the "goal orientation" of traditional causal logic, effectual decision-makers do not start from grand goals but from three foundational categories: "Who I am", "what I know", and "whom I know". They creatively explore possible opportunities and outcomes by leveraging such means as their personal traits, knowledge bases, and social networks. The second is the principle of affordable loss. Decision-makers do not fixate on predicting potential gains and pursuing

their maximization. Instead, they rigorously evaluate and limit the maximum loss that each action may bring and ensure that this loss is within their capacity to bear. This enables them to act decisively even with incomplete information and to control risks via small, iterative steps. The third principle is the strategic alliance principle. Compared with time-consuming competitive analysis and prediction, effectual decision-makers prioritise actively shaping markets through building strategic alliances. They proactively seek and engage partners willing to make joint commitments and share risks. Through engagement with these stakeholders, they collectively define and create new markets, thereby significantly reducing environmental uncertainty. The fourth is the principle of embracing contingencies. Effectual decision-makers perceive unforeseen and contingent events as new opportunities rather than threats to be avoided. They do not rigidly adhere to initially defined goals but maintain an open, adaptive stance toward the various contingencies that arise during the process. They excel at leveraging these contingencies to forge new and potentially more promising development paths [7, 8].

In contrast, traditional predictive logic is suitable for situations where market information is relatively clear, emphasising goal-driven strategies and precise planning[3]. A poignant example is the downfall of Kodak. It operated under the assumption that the future would be an extrapolation of the past, leading it to underinvest in and marginalize digital technology to protect its established film-based business. This failure to adapt to the unquantifiable uncertainty of a technological paradigm shift ultimately resulted in bankruptcy.

3. Enterprise Case Analysis: Comparison of the Effectual and Predictive of Airbnb and Tesla

Airbnb's evolutionary trajectory clearly demonstrates how its decision-making logic gradually evolves from "pure effectual logic" to "a hybrid of effectual and predictive logics." During its start-up period (2007-2008), it was purely an effect of logic, trial, and error. It all began during the Industrial Design Conference in San Francisco in 2007. Founders Chesky and Gebbia, unable to afford the rent, decided to rent out three air mattresses in the living room to conference attendees and provide a simple breakfast. The cost of this experiment was extremely low, making it a classic application of the "affordable loss" principle.

During its growth period (2009-2014), effectual logic remained dominant, with predictive logic gradually incorporated. As the platform expanded, Airbnb began to use early data to guide decision-making. A crucial turning point came when the team discovered that property photos in New York City were generally low-quality, so they took their cameras to landlords' homes to take free photos. This feedback-driven initiative significantly enhanced property appeal and exemplifies data-informed "rapid iteration". By 2024, mobile booking nights on Airbnb had increased by 18% year-on-year, accounting for 58% of total bookings. The company leverages such user behavior data to inform property type planning and refine product features—for instance, launching the "Guest Recommendation" tag, with booking volumes exceeding 200 million room nights [9].

During its mature stage (from 2015 to the present), predictive logic has become dominant, supplemented by effectual logic. Since becoming a global enterprise, Airbnb's decision-making has been increasingly driven by predictive logic, evident in its "refined market segmentation strategies" and "supply chain optimization initiatives" [9]. In the third quarter of 2024, the growth rate of room-night bookings in emerging markets outpaced that of core markets by over 200%. To capitalize on this trend, Airbnb has launched localized branding campaigns in Japan, added local payment options in Vietnam, Denmark, and other markets, and plans to offer nearly 40 local payment methods by spring 2025. Such long-term strategic initiatives exemplify predictive logic.

In contrast, Tesla's start-up period (the Roadster stage) involved flexible survival anchored in its long-term vision. When developing their first product, the Roadster, in the absence of mature battery technology, Tesla did not focus on independent research and development. Instead, it forged deep partnerships with Panasonic and leveraged external resources to solve core problems. This reflects the "strategic alliance" principle of effectual logic, which controls risks and co-creates value through collaboration [10].

During the growth stage (Model 3 capacity crisis), effectual logic enabled breakthroughs in bottlenecks. The original target of achieving a weekly production of 5,000 units by the end of 2017 remained unmet for an extended period. Confronting immense pressure, Musk did not stick to the traditional car manufacturing process (predictive logic), but adopted an extreme effect logic to respond: temporarily deploying a "tent production line", where the entire pre-assembled production line was air-freighted from Europe to the U.S. Through iterative experimentation, 300 unnecessary weld points in the original design of the vehicle body were identified and eliminated. These unconventional measures helped Tesla finally achieve the goal of producing 5,000 Model 3s per week by the end of the second quarter of 2018, successfully weathering the crisis.

During its mature stage (diversification and globalization), after navigating the production capacity crisis, Tesla has more systematically integrated the two logics. At

ISSN 2959-6130

the predictive level, it has formulated a clear long-term roadmap, such as planning to launch an affordable new model in 2025 and setting a goal of achieving an annual sales volume of 6 to 8 million annual sales by 2030. At the effectual level, this integration manifests in continuous rapid iteration and capability integration. For instance, its energy business deployed 6.9 GWh of energy storage in the third quarter of 2024, a year-on-year increase of 75%, and vertically integrated its supply chain through its self-built Megapack factory.

4. Enlightenment on Entrepreneurial Decision-making

Through the analysis of Airbnb and Tesla, it becomes evident that effectual logic and predictive logic are not mutually exclusive options but two modes of thinking that can be alternated or even coexist at different entrepreneurial stages. In the early stage of starting a business, entrepreneurs operate in a highly uncertain environment with limited resources and information asymmetry. At this point, rather than investing heavily in market forecasting, it is more effective to start with available resources (as Airbnb did), iterate through rapid trial and error, and adjust flexibly. This "replacing prediction with action" approach not only reduces failure costs but also accelerates product-market fit refinement [11].

When the start-up project is gradually validated by the market, the environment is relatively stable, and the enterprise begins to pursue large-scale development, predictive logic is more important. Enterprises with clear long-term visions like Tesla gain advantages in resource accumulation and strategic clarity, and can enhance efficiency and influence through goal-setting, data-driven decision-making, and process management [12]. Yet even at this stage, if there is a sudden change, such as supply chain breakage or technical delay, enterprises still need to revert to effectual logic, relying on internal creativity and on-the-ground adaptability to solve problems [13][1].

Therefore, the ability to understand and flexibly apply these two logics is essential for entrepreneurs. On one hand, it facilitates initiation and exploration amid uncertainty; on the other hand, predictive logic underpins systematic operations and long-term strategic planning. Future entrepreneurship education and practice should also emphasize cultivating this "hybrid logic", not only teaching how to develop business plans, but also training entrepreneurs to adapt when plans falter [14]. For instance, trainees could be placed in a simulated environment where they must apply effectual principles (e.g., leveraging a limited set of means to design a minimal viable product) to launch a project. As the simulation advances and the venture gains momentum, the challenge would shift to applying predictive logic for scaling—enabling participants to experience this logical transition firsthand. Analyzing real-world cases such as the Model 3 production crisis enables entrepreneurs to dissect how established firms deploy effectual tactics under pressure. Similarly, examining Airbnb's evolution from air mattresses to a global platform reveals how predictive analytics gradually supplemented its initial effectual approach.

5. Conclusion

This study compares effectual logic (effectuation) and predictive logic through the empirical cases of Airbnb and Tesla. It finds that entrepreneurs often apply effectual logic in early stages, using available resources, accepting affordable losses, and advancing via stakeholder cooperation. As ventures scale, predictive logic supports long-term strategic planning and expansion. The two logics can also be integrated, as exemplified by Tesla's hybrid approach. Limitations include the reliance on only two cases and the absence of quantitative data. Future research could explore broader patterns across industries, and cultural contexts and the influence of AI on entrepreneurial decision-making. The primary deficiencies of the current research lie in the representativeness of the cases and the generalizability of the arguments. The analysis in this article is heavily reliant on two specific cases, Airbnb and Tesla. The applicability of its conclusions to other industries or cultural contexts remains to be further verified. Future research improvements can include expanding the scope of case studies to include more diverse industries (such as traditional manufacturing and social enterprises) and start-ups of varying scales, thereby testing the generalizability of the theoretical framework.

Acknowledgment

I wish to thank the faculty and peers who provided valuable advice and feedback that shaped this paper. I am also grateful to the organizers of the conference for affording me the opportunity to present research on entrepreneurship and decision-making. This paper is also informed by the in-depth study of Airbnb and Tesla's cases—their stories prompted me to reflect critically on uncertainty and strategy. Any errors that remain in the paper are my sole responsibility.

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