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Paper title:
AI Startup Business Models

Keywords specific to the paper:
artificial intelligence, business model, startup, taxonomy, machine learning, pattern

Summary of the main contributions:
This research paper focuses on the identification and structuration of business models for AI-centered startups. As a lot of newly created startups center their service or product around AI, leading to an exponential growth in interest from investors and venture capital firms, there is a need for understanding the specificities of their business models to ensure these startups' long-term performance. The main contribution of this paper is to make a deep study of the characteristics of AI startups business models and structure them into categories, as well as differentiating these business models from "traditional" IT-driven companies business models, hence the main research question "What are the differences between AI startup business models and common IT-related business models?". The main goals are to identify these characteristics and patterns in order to understand the impact of AI on startup business models and develop a taxonomy that can contribute to the better understanding of AI in the startup landscape for new entrepreneurs but also investors. Thus, this paper research "contributes to a growing research stream of AI in entrepreneurship".

The authors base their work on a batch of 100 AI startups extracted from Crunchbase using the terms "artificial intelligence" and "machine learning" in order to develop a business model taxonomy focused on their common characteristics. They use the taxonomy development method proposed by Nickerson et al (2013) which allowed them to "systematically combine prior theoretical concepts with empirical insights from [their] case base." This taxonomy development method works in numerous steps, the first one being identifying a meta-characteristic -here it is the business model- and its "sub-characteristics". The taxonomy is then built by individual iterations, represented on the figure below.

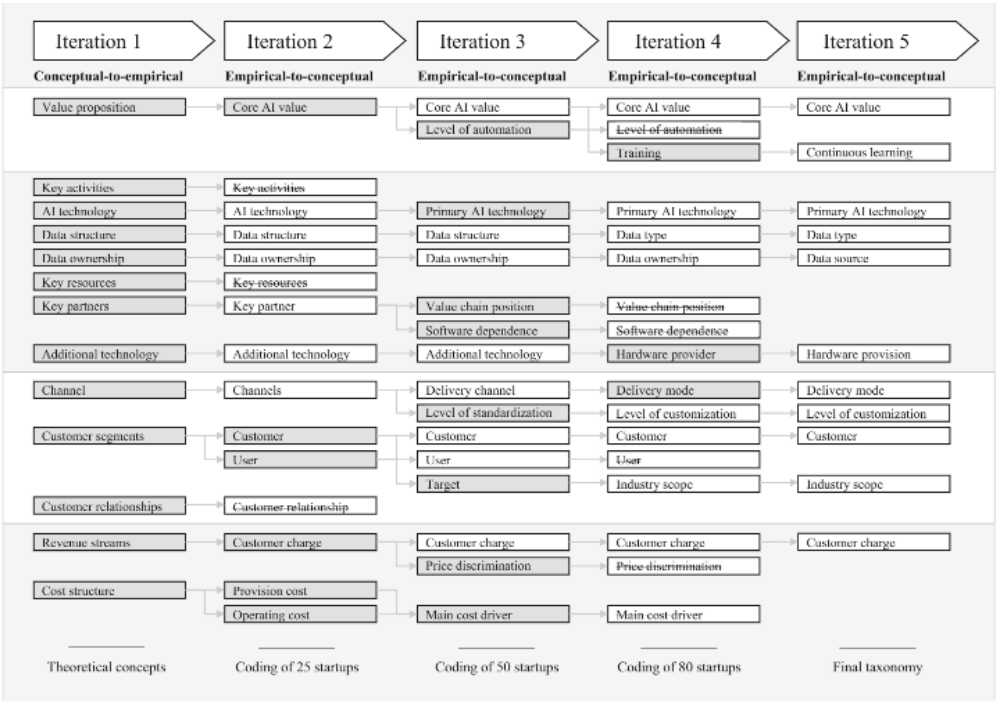

Fig. 1 Iterative development of dimensions for business model taxonomy (own illustration)

The results of the taxonomy consists of 11 dimensions and 39 characteristics proper to the conceptual concept of the business model and its sub-characteristics, which are the value proposition, value creation, value delivery and value capture. Each of these categories are classified in one to four dimensions, which are themselves defined by three to five characteristics. For example, the value creation of AI business models are classified in four dimensions, which are the primary AI technology, data type, data source and hardware provision. Data type's characteristics for instance are numeric/sensor data, textual/document data, natural language data, visual data and mixed data. You can see the detailed results of the taxonomy in the table below.

Table 2 Business model taxonomy of AI startups

Category	Dimension	Characteristics				
Value proposition	Core AI value	Cognitive insights	Monitoring & anomaly detection	Process & task support	Autonomous robots & bots	
	Continuous learning	Central learning & updates	Learning at customer side	Not provided		
Value creation	Primary AI technology	Machine learning	Natural language processing	Computer vision	Robotics	
	Data type	Numeric/sensor data	Textual/document data	Natural language data	Visual data	Mixed data
	Data source	Self-generated	Acquired	Publicly available	Customer provided on demand	Customer transmitted continuously
	Hardware provision	Yes	No			
Value delivery	Delivery mode	Software application	Programmable interface	Base technology	AI-produced output	
	Level of customization	Standardized product/service	Tailoring/ Individualization	Full customization		
	Customer	B2B	B2C	Both		
	Industry scope	Industry focused	Industry agnostic			
Value capture	Customer charge	Free of charge	Subscription-based	Transaction-based	One-time payment	

The taxonomy also helped identify four archetypal business model patterns of AI startups, which are AI-charged product/service provider, AI development facilitator, data analytics provider and deep tech researcher. Each of these patterns allow to classify the 100 AI startups case base and provide a structured basis to identify AI startups business models. This is useful not only to support further research, but can also be implemented in practical development of future business innovations. These results are generally speaking an insightful way of understanding the landscape of AI startups business models. Concerning the differences between AI startups business models and traditional I-related business models, three are mainly identified. The first one is that there are new value propositions through AI capabilities, such as automation of service and knowledge work. The second one is the difference in the role of data for value creation ; the data in AI startups business models is used to train models and not directly analyzed in products or services. The third difference is that the business models for AI startups are overall strongly centered on mastering the technology to the core ; the continuous learning of AI-based products do also have a great impact on the logic of these business models, as the products and services could potentially improve themselves through experience and use.

Note : No specific AI model was used in this research paper, as is it a study of the impact of AI startups in general. However, the most mentioned model is machine learning.

Supported by a software application? (If yes, provide more details)

Not supported by any software application