

BUSINESS MODEL DEVELOPMENT IN DATA-DRIVEN START-UPS

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Abstract. Within the last decade, the business environment has drastically changed due to a series of technological innovations, that inspire the current generation of entrepreneurs to empower digitalization in the pursuit of disruptive innovation. Today, technological advancements in the form of IoT, Big Data and AI are essential drivers for a new realm of business models (BM), the so-called data-driven business model (DDBM). Start-up characteristics like pristine business models and flexibility essentially make start-up firms a promising basis for investigating DDBMs. This paper proposes an approach to assess start-up Business models in terms of data exploitation and contributes to the discussion on the theoretical and practical benefits of DDBM by outlining key factors that enhance the development of BM through data-related activities.

Keywords: data-driven, business model, start-up, business model innovation, big data, BM, DDBM.

Introduction

Data collection and management play a crucial role in designing and the delivery of products and services. The ability to effectively utilize and analyze this data can bring a wide range of benefits for companies beyond just higher revenue. These benefits can include improved customer insights, increased efficiency in operations, targeted marketing, and the ability to make data-driven decisions. In recent years, advancements in technology have led to an increase in the generation and collection of digital data, which has in turn facilitated the use of data processing techniques in businesses. This has given rise to a new category of business models, referred to as data-driven business models (DDBM), that are based on the utilization of data as a primary driver of business strategy and decision-making (Bulger et al., 2014; Hilbig et al., 2018; Dehnert et al., 2021). Start-up firms, with the advantage of being able to create new business models from scratch rather than being limited by existing ones, offer a diverse range of presumably pure data-driven business models. Their focus on disruptive innovation, broad use of digital technologies, unique business models and flexibility because of their small size makes them a promising area for studying DDBMs.

After a comprehensive analysis of the existing literature on the topic, a new conceptual model for the classification of data-driven business models applicable (for digital start-ups) can be proposed, based on the level of data extraction and utilization within companies. Subsequently, the theoretical model will serve as a foundation for future research to address the following three main research questions:

- RQ1: “Are the proposed three tiers of data-driven business models reasonably valid for digital start-ups?”
- RQ2: “Are there any drivers to progress towards higher tiers of data-driven business models if the digital start-up has an established business model?”
- RQ3: “What are the limitations that start-up companies face to progress towards higher tiers of data-driven business models?”

Through this investigation, we aimed to gain a deeper understanding of the key factors that influence the adoption and implementation of data-driven business models. By identifying these factors, we aimed to provide a background for future research to develop an optimal framework for advancing through the tiers of data-driven business models. Our goal was to identify the key drivers of success for companies implementing

these models, as well as potential obstacles and challenges that may be encountered. By providing a thorough understanding of the model, we hope to stimulate the development of best practices and strategies for start-ups looking for data-driven business models.

1. Start-up role in economic development

Over time, startups have been shown strong potential to drive economic growth both globally and locally. They are considered to be “an engine for change” and are a trustworthy factor to determine countries’ level of innovation and economic prosperity. One of the most famous definitions of a start-up was created by a well-known business world persona, educator and pioneer of the lean start-up movement, Steve Blank. According to him, a startup is “a temporary organization searching for a repeatable and scalable business”. Some of the key start-up characteristics are innovation, young age, fast-paced and ever-changing business environment, and fast growth. Currently, the worldwide start-up economy is considered as big as a G7 nation’s GDP. The funding received by startups in 2021 surpassed \$600 billion, breaking funding records, while the number of unicorns has surged past the 1,000 mark in 2022 and continues to grow at a rampant rate (Chaudhri et al., 2022).

Even though start-up activity is burdened by a considerable degree of risk and uncertainty, its role in the business ecosystem is to explore new ways, utilize state-of-the-art technology and strive for disruptive innovation. And this is the classic innovator’s dilemma matter. Clayton Christensen’s renowned collection of books on the topic of innovation lays out a broad analysis of the factors that hinder large companies from innovating (Christensen, 1997). Large companies and enterprises also want to pursue innovation, but they actually can’t. They’re prevented from doing so because of established organizational structures and working business models, that are hard to adjust to new ways of thinking and doing (Dehnert et al., 2021). Also, they are usually not comfortable with disruptive innovation simply because they have so much more to lose. Such companies may hesitate to take a risk and gamble on a new service or product, because it could jeopardize the brand and do not satisfy their current customers. Another reason preventing enterprises from the pursuit of disruptive innovation is that when they first arise, they are not profitable initially. So, they are willing to devote more effort and resources to sustaining innovations, which are crucial to compete against current competition.

Start-ups usually transform easier than mature firms because they have fewer settled procedures and assets to re-engineer. Start-ups and their culture are modelled in

such a way that they are able to adapt to change quickly, have the ability to take risks and dare to blaze new trails, and that is the exact part they are taking in the whole business ecosystem. The role of a start-up has grown so much in recent years because of rapid technological change. Various studies imply that start-up activity serves as a very important metric of economic prosperity, and entrepreneurs play a vital role in initiating the creation of novel organizational structures, arrangements, and technologies, to work out challenges in society (Bosma et al., 2018). They address problems that no other sector is willing or able to address, and in doing so, they utilize innovative thinking. It does not only create extra jobs, empower the economy, or attract foreign investment, but also push the society ahead and increase the consumption that will increase GDP per capita in the long run (Susilo, 2020). The benefits arising from the development of the startup ecosystem in a specific country contribute to the level of innovation and economic prosperity. Startups are increasingly attracting attention from both the scientific and business communities, as they are the creators of innovative business models in the 21st century (Szarek & Piecuch, 2018).

2. Business model and business model innovation

Throughout the last decade, series of technological innovation breakthroughs, such as the widespread adoption of mobile devices, the emergence of cloud computing, and the spread of artificial intelligence (AI) and machine learning (ML), shaped the space where thousands of new disruptive businesses have been created. Both, novice and established entrepreneurs feel under pressure in finding the right business model and adjusting their firms to be flexible to change (Voinea et al., 2019). In the past years, the business model has become a developed concept. It represents a new, different dimension of innovation, supplementing established ones such as process, product and organizational innovation, thus extending the boundaries of various innovation theories and phenomena. While new business models that were once unheard of or uncommon are now a prime source of wealth and opportunity in the contemporary economy, scholars studying this subject have encountered difficulties in maintaining a consistent understanding (Massa et al., 2016).

There is huge diversity of theoretical and especially practical business models available. The business model can be defined as a framework that describes how a company creates value and delivers it to customers and the methods utilized to capture and maximize that value. It comprises a collection of elements such as cost,

revenue and profit. In other words, identifying unmet customer needs, specifying the technology and organization that will address them, and, last but by no means least, capturing value from the activities are important functions of the business model (Teece, 2018). Settled companies must regularly upgrade their business model or they will fail to foresee trends and challenges in the future and might lose customers to the competitors. Also, business model can help investors to evaluate firms, by giving insight to company's potential. Since there is a huge competition in the digital world centers around the most effective business models, companies have to innovate theirs to be successful.

The relationship between entrepreneurship and information technology (IT) has never been closer and the new technology encourages the current generation of start-ups to empower digitalization for their business model innovation (BMI) (Spiegel et al., 2016). The potential of digitalization can be exploited by applying automation, digital customer interfaces, or, for example, employing collected and available data. So, in this context, business model innovation can be defined as the process of leveraging data and technology to create new and efficient ways of delivering value to customers, fundamentally disrupting traditional industry structures, and driving growth. However, technological innovation in itself is risky and can take a long time to deploy its effects and to be fully acknowledged (Thomas et al., 2019). The exploitation of technological opportunities can seem fuzzy, firms have to address key organizational challenges before the digital can have a truly progressive influence on their long-term success (Rachinger et al., 2019).

The backbone of business model digitalization is the usage of data. There are various sources and ways to collect and gain access to data, available even for the smallest of companies. The influence of big data and AI is the next upcoming game-changer in the tech industry. Therefore, data-driven add-on is considered to be a crucial part of the business model nowadays, especially in start-up scene.

3. Data-driven business model

One of the most influential factors that shape product and service delivery is data accessible in databases or other repositories used by companies. The generation of knowledge and wisdom using such data can well contribute and work as a new source of income (Marcinkowski & Gawin, 2020). Over the recent years, the collection and processing of digital data using computers has increased significantly. Today, technologies such as IoT, Cloud Computing, Big Data, and Artificial

Intelligence are crucial drivers for the development of a new type of business model known as the data-driven business model (DDBM). This new class of BMs revolutionize the way organizations interact, generate, deliver, and capture value. Nonetheless, data by itself is worthless without meaningful interpretation, analysis, and comprehension, so data analytics tools play a crucial role not only in global corporations but also in small to medium-sized enterprises and start-ups (Dehnert et al., 2021).

There exist numerous ways how data can affect a business, but the most usual usage of data is targeted to either create new streams of revenue, improve decision-making or revamp and refine operations. The most convenient way is to utilize data to boost decision-making, since it is quite a challenge to simultaneously implement all the dimensions at once. Also, various technologies and tools can be used to analyze and interpret the collected data. For example, business intelligence (BI) solutions are a well-known way to monitor and track collected data in real-time. The tip of the mountain when considering analyzing data is big data processing. It allows to uncover trends, patterns, and correlations that are invisible to the naked eye. Thus, encouraging to make compelling decisions which lead to disruptive innovation (Bulger et al., 2014).

Big data usually represents the pinnacle of data-driven business models, and its emergence has fundamentally transformed the way companies operate and compete in the marketplace. In the competitive startup space, the ability to effectively harness and analyze big data has become a crucial differentiator, providing an edge in identifying new opportunities and staying ahead of the competition. Its objective is to extract value from vast and varied data sets that are often acquired in high velocity. With the advent of cloud computing and the Internet of Things (IoT), big data has become more accessible and affordable for businesses of all sizes. This has led to a democratization of data analytics, enabling even small companies to leverage the power of big data. The scholars view big data as an information asset that requires cost-effective and innovative methods for generating insights and facilitating decision-making. The data is not merely collected passively and incidentally but necessitates deliberate investment, which is imperative for a company's prosperity (Cheah & Wang, 2017). Big data has already influenced business models in a way, one good example proving that could be state-of-the-art companies in the retail sector, where big data techniques already accelerate the exploration of in-store customer behavior in real-time and help to adjust the pricing to maximize profits.

3.1. DDBM in start-up scene

In the past years companies started to employ powerful data channels and sources, such as smartphones and social media, as well as new technologies to utilize this data. New data, and novel approaches to it, technologies and instruments-are often exploited through digital start-up firms. Start-up companies are often not bound to legacy systems or technology, and that allows them to be more adaptable and flexible. Consequently, starting from scratch instead of being limited by existing business structures, these young ventures are able to create a diverse range of purer business models (Aagaard, 2018). Start-ups are well-positioned to take advantage of the opportunities presented by big data and digital technologies and can lead the way in developing new and innovative data-driven business models. Uber's rise from a Silicon Valley start-up to a global powerhouse challenging established taxis in over 700 metropolitan areas demonstrates how start-ups leveraging big data and digital technologies can disrupt industries. With Uber's innovative data-driven business model, they have captured a significant market share, leading to a decrease in traditional taxi rides and highlighting the disruptive potential of big data-powered start-ups. By doing so, they create significant value for themselves and the whole Tech community, as well as disrupt established players in a variety of industries (Willis & Tranos, 2021). To put it all together, due to their pursuit of disruptive innovation, pristine business models, and smaller size, start-up firms provide a promising foundation for exploring data-driven business models.

4. Research background and related work

In general, DDBM is not restricted to enterprises that conduct large amounts of data analytics, but as well includes firms that are merely processing or acquiring data (Hartmann et al., 2016). These companies may not only sell data as information, but also other products or services that are closely tied to that data. It is worth noting that all businesses, regardless of size or industry, use data in some capacity, even small grocery stores rely on data such as supplier contact details.

A recent study, conducted by Hilbig, Hecht and Etsiwah who analysed a random sample of fifty newly created start-ups and evaluated them by degree of digitalization and data exploitation, consequently outlined three tiers (categories) that help to differentiate between different BMs in terms of usage of their data (Hilbig et al., 2018) (See Figure 1).

Low data business model (LDBM) was defined as referring to companies that have low data utilization and

minimal digitization. Examples include local service businesses such as hairdressers or bakeries which don't produce or hardly any digital data.

Data-enhanced business model (DEBM) was defined as referring to companies that use digital technologies and data exploitation to improve their physical products and services, gaining a competitive advantage. An example of this is "Bolt", a carrier service that uses data to adjust prices based on service demand in different regions.

Pure data-driven business model (PDDBM) was defined as heavily relying on data as a key resource to create digital services through data generation, aggregation, processing, analytics, interpretation, visualization, exchange and distribution. Examples include platforms such as Airbnb or Netflix that use digital technologies to aggregate and analyse data to create value for customers. These models may involve big data and even incorporate self-learning AI techniques with no human interaction.

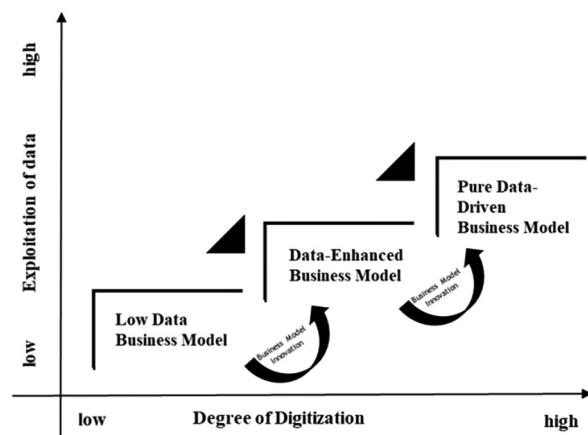


Figure 1. Three categories of DDBM (Hilbig et al., 2018)

The research delved into the significance of data-driven business models (DDBM) for both business model researchers and practitioners. The analysis presented a new taxonomy for classifying DDBM, however, the researchers proposed that this taxonomy should undergo further empirical testing to validate its effectiveness and utility. This study highlights the need for research to understand the implications of DDBM for business development trajectories and serves as a starting point for further research, additionally, it is supposed to encourage the practitioners' reflection on the new practices for data-driven businesses, with the aim of utilize the potential benefits of this paradigm shift.

Another research, presented by Breitfuss et al. (2019), discussed possible schemes to classify and distinguish data-driven business models based on thirty samples of data-driven activities and identified possible blind spots in retrieving value from these activities. Researchers

have proposed a new scheme, containing a particular focus on the value proposition dimension of business models, as it is considered to be a crucial part of many businesses model ontologies and stands for creating unique value that a firm can offer to its customer and how it can meet their needs or solve their problems (Breitfuss et al., 2019). Value proposition patterns that the research focused on were Data-enriched products and services, Data-enabled improvements, Data-as-a-Service, Data-enabled services, Big Data services and so on. These value proposition patterns, later on paired with data sources and a few other value capturing aspects (e.g., new revenue model) have led researchers to distinguish between DDBM improvement and DDBM innovation and define the framework to follow for DDBM innovation (See Figure 2).

		DDBM Improvement		DDBM Innovation	
		Data-enabled Improvements (processes)	Data-enriched Products & Services	Data-enabled Services (stand alone)	Auxiliary (big) Data Services (AaaS/PaaS/DaaS)
DDBM Innovation	Existing Data (Internal/external)				
	New Data (Internal/external)				
	New Revenue Model (Pricing Model)				
	New Customer Segments (Customer Group)				

Figure 2. Data-Driven Business Value Matrix (Breitfuss et al., 2019)

The study found that, unfortunately, the potential of data-driven business has yet to be fully realized, with most applications limited to optimization and small improvements. One major reason for this underutilization is a lack of understanding of the development process of data-driven business models. Also, the researchers admitted, that future research could explore various aspects of data-driven business models, including specific skills (such as data analytics and data management), organizational challenges (such as integrating data scientists and setting up internal competence centers), and also expand the scope of examination to encompass other fundamental dimensions of business models, beyond the value proposition alone. This holistic approach would allow for a more comprehensive understanding of the complexities and nuances inherent in the data-driven business model paradigm and pave the way for more effective implementation and optimization.

Although there are relatively few publications dedicated exclusively to data-driven business models (DDBM) and data-driven business model innovation (DDBMI), the field is both promising and exciting. Additional areas of inquiry that are worth exploring include the role of data usage culture and ethics in shaping DDBMs, as well as the processes and importance of data

protection and security for start-ups in general. Given the rapidly evolving nature of this field, further research is necessary to fully understand and capitalize on the potential of DDBM and DDBMI.

These two research studies have been used as foundation to create a new conceptual model that builds on and combines elements from the previous work. By narrowing the focus to digital start-ups, we aim to level the playing field and concentrate on the essential activities that are relevant and attainable within this scope, thereby enhancing comparability. Additionally, we strive to outline key activities that companies can undertake to leverage data in order to enhance their business model. And essentially, this not only pertains to the value proposition in terms of new products or services, but can also encompass other dimensions of the business model, such as value capturing, revenue generation, decision-making, marketing, and internal process optimization. By broadening the range of core activities and exploring various options for how a data-driven approach can impact different facets of the business model, in the future this model could serve as a practical guide or roadmap for digital companies seeking strategies to effectively gather and leverage data in order to enhance their business.

5. Modelling future research

Methodology. This study aims to create a theoretical model to classify digital start-up business models based on generation and usage of data. The classification is modelled after the one used in the Berlin study and includes three levels: Low-Data Business Model (LDBM), Data-Enhanced Business Model (DEBM), and Pure Data-Driven Business Model (PDDBM). These model elements are named according to the Berlin study to maintain consistency and reference to previous research.

In order to create a comprehensive conceptual model for classifying digital start-ups based on data-driven business models (DDBM), this study undertakes a thorough analysis of existing literature. The aim is to compile and identify the key elements associated with the previous work on DDBMs, that are applicable to the digital landscape. Additionally, we will explore theories and research to gather information on how various dimensions of the business model can be influenced. And lastly, the objective is to merge these insights into a new classification model that would have the potential to describe dimensions and business development trajectory of digital start-ups business models.

Study by (Exner et al., 2018) emphasizes the significance of data integration in core products to generate additional value propositions. The research highlights

three essential steps: data acquisition, analytics, and visualization. According to the study, almost all business core products can be enhanced through data integration, leading to the development of data-enhanced services. Additionally, the study provides examples of various types of data sources that can be utilized to achieve this integration, such as web analytics and social media data. Furthermore, (Benta et al., 2017) emphasize the utilization of user data as a means to enhance products or services, leading to the creation of new value propositions. The authors regard data as an enabler for developing innovative services based on sensor or Internet of Things (IoT) technologies. This approach involves leveraging usage patterns and other user-generated data to unlock insights and opportunities that can drive the creation of novel and cutting-edge offerings in the market. Study conducted by (Schüritz et al., 2017) explores Data-Driven Business models with a focus on Value Capturing. It emphasizes that data can be monetized through various means, not only by incorporating it as an integral component of a product or service offering but also by selling the data directly or exchanging it for goods or services to generate revenue streams. Also, the study identifies two broad application areas, namely “Data-as-a-Service” (DaaS) and “Analytics-as-a-Service” (AaaS). Another scientific research conducted (Kühne & Böhmman, 2019) introduces the concept of data-infused business models, which refers to existing business models that evolve by progressively integrating digital data and data analytics. The research suggests that in order to remain competitive, every business offering products or services will eventually need to incorporate data into its core model, and this integration gradually transforms the business model into a more data-driven approach. And (Hartmann et al., 2014) identify two primary forms of Business Model Innovation (BMI) resulting from data analytics: incremental and radical. The first form involves using (big) data to incrementally improve and optimize existing business practices, processes, and services. The second form entails innovating new products and business models based on data utilization, with a particular focus on the significance of Big Data as a crucial enabler and accelerator of such innovations.

Based on the reviewed literature, we can identify the various data-exploitation techniques and data acquisition sources mentioned in previous research on DDBMs. Additionally, it is evident that in the digital start-up landscape, there is a prevailing concept suggesting that to maintain competitiveness businesses are required to integrate more and more data, and this integration initiates a progressive transformation of the business model, adopting a more data-driven approach

over time. And therefore, we can start outlining the conceptual model for classifying data-driven business models.

The classification is determined by examining two key fields, that are closely connected as one cannot exist without the other: data acquisition (sources) and data exploitation. Without proper data acquisition, the possibilities for data exploitation and utilization become limited. Data acquisition refers to the process of gathering and collecting data from various sources, such as customer interactions, web analytics, social media, IoT devices, and more. On the other hand, data exploitation involves the analysis, interpretation, and utilization of the acquired data to create business value. This also includes applying data analytics techniques. In essence, data acquisition acts as the foundation for data exploitation. The more comprehensive, diverse, and relevant the data acquired, the greater the potential for meaningful data-driven improvements and innovations in business.

When it comes to data exploitation, a range of activities were identified, including Data-Enriched Services, Data-as-a-Service (DaaS), Data-Driven Marketing, and Data-Driven Decision Making, as well as applicable and relevant data sources in each context. The activities selected for the model were meticulously based on a comprehensive evaluation that encompassed theoretical reviews, analysis of recent industry reports, and insights gained from current business practices and aligned with the classification framework. A conceptual approach can be summarized as follows:

Low-Data Business Model (See Figure 3) describes companies that primarily rely on traditional methods of decision-making and has limited use of data in their operations. They may acquire some data but do not use it extensively to inform decisions or improve their products and services.

Data-Enhanced Business Model is relevant to a situation of a start-up company that has started to incorporate data into their decision-making process and uses data to improve certain aspects of their business such as marketing and internal operations. They may use data-driven marketing, data-driven decision making, and data-enabled improvements to optimize specific business functions. They may also use data to gain insights into market trends and competition, but their data usage is not yet fully integrated and centralized across the organization.

Pure Data-Driven Business Model describes a company that heavily relies on data to inform all aspects of their operations and decision making. They use data to develop new products and services, optimize their internal processes, and create new revenue streams such

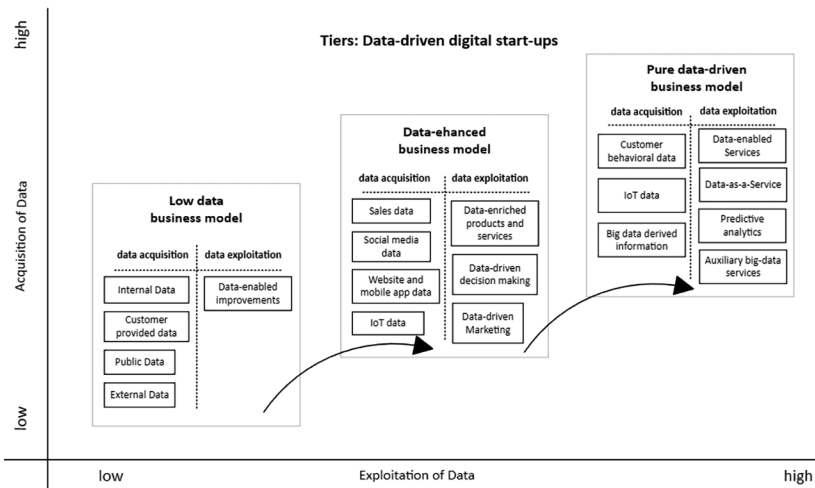


Figure 3. Conceptual DDBM classification model for digital start-ups (created by author)

as data-as-a-service. They also use Predictive analytics, Data-enriched products and services, and Data-enabled services to create new revenue streams, to gain a competitive advantage, and to become more responsive to market trends.

It is important to acknowledge that certain data-driven activities may fall on the borderlines of classification and may slightly vary depending on the specific industry, nature and features of a digital product, or service. Therefore, this model, its structure, activity set, sequency and direction of development will undergo further testing to verify their accuracy and alignment with real-world scenarios.

Additionally, it is crucial to consider the various limitations that can impede businesses from progressing towards a more data-driven business model. These limitations can include factors such as data privacy and security concerns, technological infrastructure limitations, regulatory compliance requirements, resource constraints, and organizational culture barriers. Recognizing and understanding these limitations is essential in order to develop effective strategies that address them and nevertheless facilitate the transition to a data-driven approach.

Given the relatively new nature of this field and the limited number of supporting studies available, further research could involve testing the outlined conceptual model through exploratory empirical research. Exploratory research would play a crucial role for testing and further development of this model in the initial phase as it enables a deeper understanding of the problem's nature and scope and could help to identify key components and potential additions to the theoretical model proposed.

Conclusions

In this rapidly evolving decade of technological advancements, digital businesses are striving to adapt to emerging technological trends. Among these trends, the implementation of Data-driven business models (DDBM) has emerged as a significant focus. As the importance of data and analytics continues to grow, businesses are recognizing the immense value of leveraging data to drive decision-making, innovation, and competitive advantage.

The lack of a precise definition for data-driven business models, due to their diverse nature and implementation approaches, inspired the development of the conceptual framework to classify data-driven business models of digital start-ups. The conceptual model developed through comprehensive theoretical research would serve as a valuable contribution to the emerging theoretical research field of data-driven business models and has the potential to provide insights into the interplay between theoretical and practical aspects of the digital start-up business development. While not definitive, it offers a framework that can shed light on the challenges, opportunities, and development trajectories faced by digital start-ups as they navigate the data-driven landscape.

To validate the conceptual model, the necessity of exploratory empirical testing is necessary. Therefore, further research studies shall be conducted. The next study should focus on exploratory research, which plays a vital role in gaining a deeper understanding of the problem's nature and scope. This exploratory phase would help better identify key components, factors, and limitations of the model proposed. For this study, an expert survey would be meaningful. A pilot group of CEOs or

CTOs from digital start-ups could serve as experts to be interviewed in order to test and validate the created conceptual framework. The choice of experts from a specific geographical location and industry may enhance a more focused and in-depth examination of the topic at this pilot stage of the research. To address the research question of whether the proposed three tiers of data-driven business models are suitable for digital start-ups, the experts could be asked to assess the clarity and relevance of the models to real business practices and to suggest any additional elements that may be relevant. Additionally, the experts could be asked to classify their own businesses according to the proposed classifications, as well as questioned about the existence of a desire or drive for companies to advance through the classification levels, identifying any potential obstacles that may impede progress, and exploring the reasons behind these limitations. The goal of this exercise is to verify the validity of the models through the experts' opinions. This should help to establish a stronger foundation for understanding the proposed model, and to identify the areas where additional research or refinement may be needed.

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VERSLO MODELIO KŪRIMAS SKAITMENINIUOSE IR DUOMENIMIS PAGRĮSTUOSE STARTUOLIUOSE

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Santrauka. Per pastarąjį dešimtmetį verslo aplinka drastiškai pasikeitė dėl daugybės technologinių naujovių, kurios įkvėpė naują verslininkų kartą įdarbinti skaitmenizaciją ir taip siekti perversmą darančių inovacijų. Naujausios technologijos, tokios kaip daiktų internetas (angl. *IoT*), didieji duomenys (angl. *Big Data*) ir dirbtinis intelektas (angl. *AI*), yra pagrindinės naujų verslo modelių, vadinamųjų duomenimis pagrįstais verslo modeliais (angl. *DDBM*), varomosios jėgos. Startuoliams būdingos charakteristikos, tokios kaip lankstumas ir greitis, iš esmės daro startuolių įmones perspektyviu pagrindu tiriant šiuos verslo modelius. Šiame darbe siūlomas konceptualus modelis, padedantis įvertinti startuolių verslo modelius duomenų panaudojimo požiūriu, prisideda prie diskusijos apie teorinę ir praktinę duomenimis pagrįstų verslo modelių naudą, nurodant pagrindinius veiksnius, skatinančius verslo modelio plėtrą per su skaitmeniniais duomenimis ir jų panaudojimu susijusią veiklą.

Reikšminiai žodžiai: verslo modelis, duomenimis pagrįstas, skaitmeninis startuolis, startuolis, verslo modelio naujovės, didieji duomenys, BM, DDBM.