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## Article

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Journal of Open Innovation: Technology, Market, and Complexity

## Provided in Cooperation with:

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*Suggested Citation:* Zarrouk, Hajer; el Ghak, Teheni; Bakhouch, Abdelazak (2021) : Exploring economic and technological determinants of FinTech startups' success and growth in the United Arab Emirates, Journal of Open Innovation: Technology, Market, and Complexity, ISSN 2199-8531, MDPI, Basel, Vol. 7, Iss. 1, pp. 1-24,  
<https://doi.org/10.3390/joitmc7010050>

This Version is available at:

<https://hdl.handle.net/10419/241636>

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Article

# Exploring Economic and Technological Determinants of FinTech Startups' Success and Growth in the United Arab Emirates

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**Abstract:** In the last few years, the United Arab Emirates (UAE) has emerged as a regional hub serving as an incubator of the FinTech ecosystem, where regulators began implementing policies to encourage the growth of Fintech ventures in 2017. However, detailed empirical evidence concerning the impact of various FinTech-level and ecosystem-specific factors as determinants of FinTech success and survival is yet to be discussed. This paper investigates the underlying factors influencing the success of UAE-based FinTech ventures. Several factors are included in the analysis, controlling for the hedonics of the FinTech, including the business model, availability of and access to finance, and business ecosystem framework. Data are pooled using a semi-structured questionnaire conducted with 32 FinTech founders. A qualitative analysis with an ordered logistic regression model was performed. The findings suggest that the availability of resources, in particular through venture capital, is vital to the success and survival of FinTechs as microbusinesses. However, financial barriers, the regulatory environment, and legal issues have a detrimental impact on facilitating the creation and growth of FinTech ventures. Furthermore, the business model dimensions “product/service offering” and “value proposition” tend to influence the success of these ventures. The empirical model’s findings will serve as a data-driven tool to help guide finance policymakers in their decisions on how to promote this new sector.

**Keywords:** FinTech; startup; success; access to finance; VC; business environment; business model



**Citation:** Zarrouk, H.; El Ghak, T.; Bakhouché, A. Exploring Economic and Technological Determinants of FinTech Startups' Success and Growth in the United Arab Emirates. *J. Open Innov. Technol. Mark. Complex.* **2021**, *7*, 50. <https://doi.org/10.3390/joitmc7010050>

Received: 12 January 2021

Accepted: 26 January 2021

Published: 1 February 2021

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## 1. Introduction

In recent years, the global financial system has been significantly transformed by the historically unprecedented dual expansion in financial innovation in terms of product variety and the adoption of information and communications technologies (ICTs), with implications for cost efficiency and information asymmetries. The deployment of ICTs in the financial market has resulted in more international capital flows, lower transaction costs, reduced information asymmetries, and new investment opportunities locally and abroad for both novice and experienced investors [1].

Schumpeterian economics asserts that financial development promotes innovation and that innovation is a mainstay for stimulating economic growth through disrupting existing economic models and technologies. Financial development can be defined as adopting innovation-driven improvements in financial instruments, markets, and intermediation, with the favorable effects of information, regulation, and transaction costs [2]. In recent years, the formidable advances in technology and communication and the propagation of technology applicability to finance have led to the emergence of a new segment in the financial sector, which is referred to as FinTech [3].

Reference [4] defines FinTechs as “innovative companies active in the financial industry making use of the availability of communication, the ubiquity of the internet, and the automated processing of information”. According to [5], FinTech can be understood as “the use of technology to provide new and improved financial services.” Building on these two definitions, FinTechs refer to organizations which embrace disruption by applying advances in innovation and technology, such as communication, the internet, and automated processing of information, to operate outside traditional financial intermediation business models [4]. They are increasingly redefining traditional finance, enabling broader financial inclusion, and allowing customized customer experiences [6]. In terms of industry, FinTechs are expected to increase the efficiency of the financial industry, help reduce and diversify risk [7], and alleviate information asymmetries [8]. Conventional financial intermediation and traditional financial markets have been shaken up by the emergence of FinTechs. A survey by [6] reported that 88% of financial firms believe that all or part of their business is at risk of FinTech, which is emphasized in the segments of personal finance, payments, and fund transfer. This may pressure financial institutions into extending capabilities to support their deployment of technologies and invest in FinTech to be able to stay afloat and protect their market share. Additionally, a report by [9] showed that the increasing consumer awareness regarding the significant capabilities and efficient delivery modes of FinTechs has turned these ventures into a standalone competitor to traditional financial intermediation, pressuring conventional intermediaries into adapting survival strategies by embracing the disruptive nature of FinTech innovations.

In recent years, the financial services industry has witnessed significant disruption driven by the ongoing wave of innovation, digitation, and digitalization introduced by FinTechs. FinTechs have become an essential component in the broader and evolving chain of financial innovation [5], brought about by a wave of liberalization and technological advances incepted in the 1970s [7]. The emergence of FinTech has had positive effects on consumer welfare as the cost of financial services has lowered, and easier access to a broader range of financial services has been granted, thus expanding financial inclusion [10].

The further development of FinTechs is almost certain as government policies around the world are embracing the not so long-term goal of the post-COVID-19 era, in which access to different services, such as financial services, will be fully provided through online platforms. Therefore, the role of FinTechs in achieving the goals of policy is very significant.

Building on the above, in order to ensure that FinTechs can effectively and efficiently participate in the transition of financial services to more efficient modes of delivery and processing, it may be essential to have a regulation allowing these FinTechs to exhibit traits of success [11]. In the case where FinTechs face obstacles from different sources disturbing their organic growth, this may signal that the wider environment is not empowering this non-traditional segment, resulting in losses not only to entrepreneurs and the financial sector, but also the whole of society. Losses can take the form of higher information asymmetries, higher transaction costs, and a less rapid flow of information and slower decision making process.

In the Middle East and North Africa (MENA) region, the FinTech industry is predicted to enter a new growth era. It is expected to capture eight% of the financial services revenue by 2022, driven by demand for a better customer experience, according to a report by FinTech Hive and Accenture [12], which is a consultancy firm. The number of FinTech companies has expanded from 91 in 2010 to 839 in 2017, but this region has attracted only 1% of the \$50 billion invested in FinTech globally over the same period. According to [13], the MENA FinTech market will see an annual growth of US\$125 million until 2022, directed by investors' interest in the region's FinTech opportunities. By 2020, MENA is anticipated to be hosting around 250 startups that are set to attract US\$2.5 billion in deals. In MENA countries, the United Arab Emirates (UAE) in particular has pioneered regional efforts envisioning a greater adoption of technology by the financial services industry, among others, by providing support leveraging the development and expansion of FinTech. Overall, the financial free zones in Dubai and Abu Dhabi (the Dubai International Financial

Centre (DIFC) and Abu Dhabi Global Market (ADGM)), several accelerators, and a set of venture capital firms are looking to tap into the prospering FinTech industry. In fact, according to [14], the country is home to the highest number of startups and investments in this nascent sector: 67 FinTech startups, followed by 44 in Turkey and 30 each in Jordan and Lebanon. However, South Africa leads in Africa, with 184 startups, followed by 146 in Nigeria, 111 in Kenya, 36 in Ghana, 34 in Egypt, and 24 in Uganda. It is particularly important for countries which are integrating the latest generations of technology into the economy to ensure that the FinTech segment of the wider financial services can flourish, in order to reap the benefits obtained by reducing transaction costs, enhancing competition, and providing support for ensuring stability of the financial system. Helping FinTechs succeed will also help banks to adopt similar business models and acquire these FinTechs if necessary, which should bring about further efficient allocation of resources and the alleviation of information asymmetries. Within this context, where the FinTech segment is still novel and in its infancy stage, this paper contributes to the existing literature in two ways. First, to the best of our knowledge, factors influencing FinTech startups' success are rarely discussed, particularly in the UAE, and there has not been much progress in this area. The present paper fills this gap. Second, access to data on FinTech startups is limited, since such data are mostly private. To gather relevant information, a questionnaire was used. The purpose of the article is to determine the main factors affecting the success and growth of FinTech startups operating in the UAE by exploring a range of variables, not only in terms of the characteristics of founders, but also regarding a number of other explanatory factors which convey information about financial, technological, and environmental characteristics. The following research questions are addressed:

What are the driving forces supporting the success and growth of FinTech startups? How and to what extent do these factors affect FinTechs' success?

The remainder of this paper is structured as follows. The next section presents an outline of the FinTech business environment in the UAE. The literature review and build-up of hypothesis are then presented. From this, a research agenda emerges. Following a description of the methodology employed to engage with this, empirical qualitative and quantitative data on the experiences of a sample of 32 FinTech startup founders are presented. The following sections provide an analysis and discussion of the results and the main findings and implications. The paper concludes with recommendations for FinTech research and practice in the UAE.

## 2. FinTechs in the UAE: Reality and Perspective

FinTechs emerged in the Gulf region in 2017, when regulators began implementing policies to stimulate the sector's growth. Generally, the development of entrepreneurial activities has followed the "hub model", through which nascent startups and ventures, including FinTechs, originate from geographical enclosures, commonly referred to as startup or FinTech hubs [15]. The UAE has a favorable regulatory framework embracing the creation of innovation and development of entrepreneurship and has begun implementing policies to encourage the FinTech sector's growth. Three key factors (Appendix A) have made the ecosystem favorable for determining the UAE as a leading FinTech hub in the wider MENA region: (i) The government is at the center of efforts to drive innovation as part of a larger vision; (ii) it has an ecosystem that is conducive to new financial alternatives; and (iii) continuous initiatives and policies are implemented to attract international human capital as an effective tool of stimulating innovation domestically [16] through spillover effects.

The FinTech sector has undergone rapid growth in the UAE, making the country the largest FinTech hub for startups in the MENA region. This sector has flourished due to the national visions; the expansion of the government-driven ICT ecosystem; the establishment of financial free zones; supportive government body initiatives and policies, including sandboxes; accelerator programs; the launch of investment funds; a private sector that is keen to partner with innovative FinTech startups; and a young, tech-savvy popula-

tion, both in the UAE and the wider region, that is eager to adopt the latest innovative financial services.

The UAE has established itself as the largest regional FinTech hub for startups in MENA countries. Reference [17] concluded that the UAE hosts the greatest number (46%) of FinTech startups in the MENA region. Reference [17] also found that the UAE accounted for 47% of all FinTech deals and 69% of all funding in 2019. Similarly, [16] stated that the UAE is home to a third of the regional FinTech startups.

A top-down government approach may have inflicted positive effects on the FinTech ecosystem in the UAE. This, combined with an increasing demand for FinTech solutions, has resulted in a conducive FinTech startup ecosystem that can replace traditional financial services' delivery modalities.

One key factor influencing the development of the FinTech sector in the UAE is the growing domestic, regional, young, tech-savvy potential customer base. The UAE already boasts very high ICT adoption rates, and has high cellphone usage, with many people having more than one mobile device.

According to [18], the UAE occupies advanced positions in tables ranking countries per rate of ICT adoption worldwide. For instance, mobile-cellular telephone and mobile-broadband subscriptions increased, from 2000 to 2018, by 208.5% (2nd place) and 250% (1st place), respectively. Internet users in the country made up 98.5% of the population (5th place) in 2018. The U.S. management consulting company McKinsey state that the mobile payments sector in the UAE is set to grow by 30% a year. This figure is also apparent in the wider region, as the mobile payment industry in the Middle East and Africa is anticipated to reach a compound annual growth rate of 17.8% to record \$434.5 billion by 2025.

### 3. Literature Review and Build-Up of Hypotheses

Previous works [5,15,19] have divided FinTechs into five distinct functional areas, broadly described as (i) financing (including deposit, lending, credit, and capital-raising services); (ii) payment, settlement, and clearing services, including digital currencies; (iii) investment management services (such as in trading); (iv) insurance and risk management (InsurTechs); and (v) regulatory technology (RegTech).

Some studies have attempted to develop a consensual and coherent definition of FinTech [4,5,15], whilst others have explored the impact on the traditional business model [4], relationship and effect on traditional financial intermediation and areas of crowdfunding [20–22], and financial inclusion [23]. Some studies have pointed to implications for risk, regulation [11], and overall financial system soundness [19,21,24].

Success and failure are only two outcomes for novice ventures [25]. Success, which is a mainstay for survival, indicates achieving planned targets, whereas failure reflects underperformance measured by actual sub-par outcomes [26]. There is a significant body of literature on the driving forces of survival of new ventures introducing new technologies in different industries [1,27]. While a wide range of human capital, organizational, technological, and environmental influences have been proposed as critical to the survival of these ventures, there is hardly any agreement on the nature of incentives of survival of FinTechs, and how and to what extent the success of FinTechs responds to these incentives.

Studies on entrepreneurship have proposed that new ventures' success can be explained by a set of internal and external factors. Internal factors are related to individual and venture attributes, whereas external factors comprise environmental conditions within which the venture is operating [26]. First, individual characteristics relate to the founders' attributes, such as the founder's human capital and experience [27]. The founder's technical capital can be ascertained through the nature and type of the business model adopted for the venture. Second, the venture's characteristics are its financing, organizational traits [25,27]. Environmental conditions are events outside the control of the individual or the venture, such as poor economic conditions, bank characteristics, inadequate govern-



ment policies, the state of technology used in the venture, and the technological know-how of the founding team.

Numerous studies have demonstrated that the pursuit of entrepreneurship and innovation entails a significant role of external finance. Schumpeterian economics suggests that greater access to external finance increases the probability of the entry of new ventures and the subsequent growth of exciting companies, which improves market competition and stimulates incumbent firms to innovate to survive [2]. Reference [28] surveyed sources of finance available to new ventures and distinguished between internal and external sources. The internal source consists of founders' or family and friends' savings or bootstrapping funds generated by some form of income with early product development as alternative or complementary capital during the startup stage. This type of fund represents finance raised through social capital in the pursuit of startup ventures. However, entrepreneurs cannot solely depend on this. Therefore, they resort to external funds obtained from a venture capitalist (VC), especially in the early stages of business. New forms of entrepreneurship funding have recently gained momenta, such as equity crowdfunding platforms, accelerators, microfinance, and peer-to-peer lending [29].

Obtaining funds from traditional creditors may indicate the presence of tangible and intangible collateral, lower information asymmetries, and a strong prospect of a superior performance by the focal venture [30]. However, traditional creditors tend to show reluctance in providing finance for new technology-based ventures because they pose challenges involving high default risks and strong information asymmetries. Furthermore, formal capital markets find it difficult to assess high-technology ventures' economic potential, given little or no past presence in the ecosystem and the unavailability of sufficient exogenous signals about prospects. External signals can be extended to aspects such as financial statements, third-party assessment, and market feedback about innovation activities [30].

The literature has widely acknowledged that new ventures tend to face obstacles accessing external direct or indirect finance. Investors in traditional credit markets prefer to allocate capital to well-established income-generating firms, rather than new ventures or innovative firms, because the default risk is lower. On the other hand, greater access to bank credit involves significant asymmetry, transaction costs, and collateral requirements [2,29], and further long-term debt restricts the level of profitability for small businesses [31].

Generally, limited external funding is a frequent obstacle faced by innovative entrepreneurs. Many studies have found that risk is inherent in innovation activities because of asymmetric information, and a substantial investment of time, effort, and capital is necessary to safeguard and generate returns [32]. Reference [15] showed that the main source for external finance intervening at different stages of new business is venture capital. The literature recognizes 'informal' investors as the primary source of risk capital [28]. Startups prefer informal venture capital as this allows them to circumvent the expensive validation of initial public offerings (IPOs) and the rigorous disclosure requirements for public listings.

Extant studies exploring the linkages between venture capital and innovation and technology-based enterprises highlight VC's role in reducing information asymmetries arising from a lack of past market performance and lack of collateral. Reference [28] examined the role played by venture capital and angel groups in the growth of 256 new Italian digital ventures between 2012 and 2017. The results suggested that VC funding has a positive impact on the growth of new digital ventures, particularly during the scale-up stage. Reference [33] evaluated the external financing alternative for FinTech startups. The study proposed useful tools to entrepreneurs for determining the critical factors when measuring the optimal financing alternative in crowdfunding, angel, and venture capital.

Human and social capital is also central to startups' fundraising activity, as surveyed by [34]. Fund providers may receive and interpret signals of human capital and how an investment might affect venture survival. The literature has emphasized the ability of VC providers to use the human, social, and technical capital of entrepreneurs as signals

of future success. Experienced venture capitalists may have developed strong selection capabilities, enabling them to identify projects with superior success potential [30].

In addition to financial resources, VC investors can assist with enhancing the output of the venture. Venture capitalists exhibit superior selection capabilities as they tend to be able to identify high-potential startups with more outstanding technological capabilities. Reference [30] noted that VCs improve the focal firms' innovative performance, and thus success, through their ability to encourage them to produce greater technology-based outputs. VC can contribute to the strategic and operational endeavors of the venture, including the recruitment of key personnel; business plan development; networking with other VC peers, firms and investors, prospective customers, and regulators; and allowing access to in-depth industry knowledge [30]. From the literature, the following hypotheses are formulated:

**Hypotheses (H1a).** *The success of FinTechs is impacted by the type of financing source.*

**Hypotheses (H1b).** *The degree of access to finance influences the success of FinTech startups.*

The development of industry requires a nurturing ecosystem that encourages entrepreneurial endeavors through the supply of knowledge, technical skills, and financial support, under the patronage of an embracing regulatory framework and favorable economic conditions [35]. The application of recent technological advances in the finance domain is having a profound effect on the ecosystem of the financial services industry. Reference [19] identified five symbiotic participants in the FinTech ecosystem: (i) FinTech startups (in the areas of payment, lending, wealth management, crowdfunding, capital market, and insurance FinTech companies); (ii) technology developers (big data analytics, cloud computing, cryptocurrency, and social media developers); (iii) the government (financial regulators); (iv) financial customers (individuals and organizations); and (v) traditional financial firms (e.g., commercial banks, insurance companies, stock brokerage firms, and venture capitalists).

One strand of the FinTech literature has found that the thriving of FinTech is the result of financial innovation encouraged by a plethora of systematic factors. For instance, reference [36] evaluated the relationship between financial innovation and several environmental variables based on data from thirty-two countries over the period 1996–2006. They found that financial innovation is more intensified and provides greater benefits in countries where market principles govern the financial system, banking systems exhibit more competition, and regulatory frameworks show accommodation. Financial innovation was shown to be brought about by the combined effect of liberalization and technological change advances, leading to the emergence of new products, revolutionized delivery modalities, and an improving productivity [7]. The application of new techniques can result in lower financial intermediation costs and improved products for consumers.

Reference [21] supports the view that FinTechs can benefit underprivileged consumers who face obstacles in obtaining finance because of asymmetric information. The expansion of advanced data analytics and the growing usage of big data in conjunction with the increased use of advances in mobile telephony create the potential to expand financial inclusion. Therefore, the emergence of FinTech is instrumental in the growth of innovation, stimulation of the economy, facilitation of collaboration, and enhancement of competition in the financial industry [19].

Reference [15] investigated several environmental influences with an economic and general technical nature that induced the formation of FinTech startups in 55 countries between 2005 and 2015. Their results show that the formation of FinTech enterprises is associated with countries characterized by an advanced financial system and readily available venture capital. Furthermore, the data demonstrate that technological conditions measured by the number of secure Internet servers, mobile telephony subscriptions, and the abundant availability of a technologically-skilled labor force have positively affected the formation of FinTechs. Finally, this study found that FinTech formation tends to be

higher in ecosystems where access to formal loans is constrained due to more stringent bank lending regulation and scrutiny.

The role of regulation has also been found to be important in the area of not only setting up a financing modality for FinTech startups, but also attracting a critical mass of highly specialized individuals, critical to establishing and developing a FinTech hub or ecosystem [11,37] supporting technological systems paired with factors such as clear immigration laws, pension systems, and affordable housing help with the prosperity of FinTechs [15]. Reference [38] predicted that more regulation, an administrative burden, and market intervention by the government negatively influence entrepreneurial endeavors, inflicting harm on the mechanism of knowledge transfer and intra-industry knowledge spillover. Reference [39]’s findings stress that higher levels of corruption lead to increased financial sector vulnerability, while regulatory and supervisory practices that force accurate information disclosure promote financial companies’ stability. Based on this, the following hypothesis is formulated:

**Hypotheses (H2).** *Business environment: A regulatory, entrepreneurship, and infrastructure framework has a positive effect on the success of FinTech startups.*

The founder’s technical capital can be revealed through the nature and type of business model adopted for the venture. Reference [40] synthesized the business model as a novel unit of analysis, which can be used as a broader framework to assess the performance of a wide spectrum of activities which encompass value creation and/or value capture. Additionally, reference [41] provided an exemplary characterization of the business model concept at the beginning of the digitalization of traditional financial services. In the context of FinTechs, disruptive business models evolve around advanced technology and a customer-centric perspective. This allows FinTechs to gain new markets and customer interactions, propose different revenue generation mechanisms, and use new approaches for producing customer-centric products and services [40].

To structure and better relate identified business models in the FinTech sector, reference [42] developed FinTech business models’ taxonomy. They suggested six dimensions of FinTech business models: The dominant technology component; value proposition; the delivery channel; customers; the revenue stream; and product/service offering. In their study, they developed a taxonomy of FinTech business models following a theoretically grounded and empirically validated approach for identifying and defining underlying business model elements.

Based on this research, reference [43] built upon an extended taxonomy and analyzed the business model’s impact to distinguish the determinant factors involved in the potential success or failure of FinTech companies. Their findings showed that FinTechs have a substantial impact on unlocking new markets, introducing different revenue generation mechanisms, and implementing novel approaches for producing customer-centric products and services. In particular, their findings indicated that the business model component “product/service offering” is the major determinant for the success of FinTech firms. Business model theory is predicated on the following hypothesis:

**Hypotheses (H3).** *The business model positively affects FinTech startups’ success.*

## 4. Data and Methods

### 4.1. Method of Data Collection

This research adopted a qualitative method, using a semi-structured questionnaire (see Appendix B) as the primary source of data capture. The semi-structured questionnaire allowed participants to discuss their experiences in their own words and for themes not pre-anticipated to emerge. The questionnaire was developed to measure entrepreneurs’ success, and the different factors affecting success were constructed. The questionnaire consisted of six constructs: ‘venture hedonics/demographics’; ‘access to finance’, ‘business model’; ‘business environment and obstacles’; ‘COVID-19 pandemic impact on current business firms’; and ‘measures and perceptions of success’.



One hundred and nineteen emails were sent to FinTech founders located in the UAE, with their startup operating in the finance and technology industry. The survey was also sent to a number of FinTech firms active through ADGM and DIFC. There was a low rate of response to requests to participate, even though all contacted were assured of confidentiality and anonymity. In total, 21 of 53 that did reply declined to be interviewed or to respond directly to the questionnaire. A total of 32 FinTech business founders representing 32 firms participated in this research.

Questionnaires were answered and interviews (online) were conducted and transcribed verbatim. In several cases, despite assurances that the research was for academic purposes, participants were cautious about revealing many details about their firms, finances, partnership arrangements, and markets. Due to this reticence, some data were obtained using secondary data sources, such as the news, articles, and published case studies, with specific use of the online database crunchbase.com, which is a crowdsourced online database of startups, founders, venture capitalists, and other funding organizations.

Despite this reticence, the 32 interviewees did provide rich data. However, while some spoke entirely candidly, a few tended to speak in abstract terms, rather than providing information directly relating to their startup or specific experiences.

#### 4.2. Econometric Specification

Logistic regression is traditionally adopted by studies on the perception of success to explain the relationship between one dependent binary variable and one or more independent variables, on a nominal, ordinal, interval, or ratio level.

In logistic regression, a new dependent variable is created, known as the logit(P). The logistic formulas are expressed in terms of the probability that  $y = 1$ , which is noted as P. The probability that  $y$  is 0 is equal to  $(1 - P)$ . If P is the probability of 1 at any given value of  $x$ , the odds of 1 vs. 0 at any value for  $x$  are  $P/(1 - P)$ . The logit(P) is the natural log of this odds ratio. Therefore,  $\text{logit}(P) = \ln(\text{odds}) = \ln[P/(1 - P)]$ .

In logistic regression,  $\text{logit}(P) = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_i x_i$ .

However, in this study, an extension of the logistic regression Ordered Logit (OL) model was used to identify the significant factors in the model that lead to a higher or lower business performance. It was applied when the dependent variable was categorical and had a meaningful order with more than two levels. In fact, the dependent variable of interest, which is the success perceived by the founder, indicated by  $y$ , was considered the discrete realization of an underlying, unobservable (latent) continuous random variable,  $y^*$ . It was constructed as a dichotomous indicator of success with three categories: (i) "0", not at all successful/fairly unsuccessful; (ii) "1", fairly successful; and (iii) "2", very successful. The categories were contiguous intervals on a continuous scale.

We assumed that the latent variable  $y^*$  is driven by the following linear structure [44]:

$$y^* = \beta x_i + \epsilon_i.$$

The observable categorical variable,  $y$ , was assumed to arise from  $y^*$  as follows:

$$y_{i=j} \text{ if } \delta_{j-1} < y_i^* \leq \delta_j, \quad (1)$$

where  $j = 1, \dots, M$  and  $i = 1, \dots, N$ .  $M$  indicates the total number of alternatives of the dependent variable (three in our case), and  $N$  represents the sample size (32 in our case). Additionally,  $x_i$  is a column vector of explanatory variables,  $\beta$  is a row vector of parameters to be estimated, and  $\epsilon_i$  is the logistic distributed random error.  $\delta$  represents unknown cut-points of the response categories in the distribution of  $y^*$ , which were estimated along with  $\beta$ , where  $\delta_0 = -\infty$  and  $\delta_M = +\infty$  [44].

Finally, the probability that observation  $i$  will choose alternative  $j$  is equal to

$$P[y_{i=j}] = P[\delta_{j-1} < y_i^* \leq \delta_j] = F(\delta_j - \beta x_i) - F(\delta_{j-1} - \beta x_i), \quad (2)$$

where  $F$  is the standard logistic cumulative distribution function represented as

$$F(\varnothing) = \frac{e^{\varphi}}{1 + e^{\varphi}}. \quad (3)$$

## 5. Results

The FinTech startups considered in this study were classified by their field of activity, as follows: (i) Payment/billing services represent the highest percentage of 22% of all categories; (ii) Lending services constitute 19%; and (iii) regulation, (iv) wealth management services, (v) capital markets, (vi) insurance services, and (vii) money transfer/remittances involving international money transfers and tracking software represent 45% (with around 9% for each category). The lowest representation of 14% was recorded for (viii) crowd-funding and (ix) mortgage/real estate, including mortgage lending, digitalization, and financing platforms. This indicates that the sample reflects the distribution of FinTech in the UAE [16]. According to [17], remittance and payment constitute 45% of all categories, suggesting that the demand for innovation in these activities was substantial.

In total, 19 FinTechs have received VC funding, representing 59% of the firms in the sample considered. A higher percentage of 47% have received a pre-seed or seed round, while startups with series A or B show a lower percentage of 12%.

Equipped with a deep knowledge of the relations between the degree of access to finance, the business environment, and the business model and FinTech, in the next step, we used the ordered logit regression model to investigate the factors predicting the success of FinTech ventures. Different factors, expressed in the form of a number of characteristics, were included as explanatory variables. Furthermore, we controlled the founder's background, experience, age, team founder, and COVID-19 implication for business. The firm success, as perceived by founders, was included as the dependent variable.

Table 1 gives a brief overview of the significant factors that influence FinTechs' performance.

### 5.1. Financing

With respect to the financing factor, the analysis revealed that VC highly influences the financing and success of FinTech startups. The findings could have been partially driven by VC's selection of companies based on their potential technological performance of FinTech firms' success.

The MENA FinTech sector is growing at a compounded annual growth rate of 30%. It is expected to pull in over \$2 billion in venture capital funding by 2022, with the UAE having the largest share of total FinTech funding [16].

Access to finance appeared to be statistically negatively significant (Tables 2 and 3). Many interviewees reported that they had been attracted by the government's different initiatives, such as the FinTech-bootcamp or ADGM FinTech festival, and the opportunities to raise funding.

**Table 1.** Number of significant predictor variables resulting from the multiple Ordered Logit (OL) regression analysis.

	Name	Significant Variables	Total Variables	Definition and Characteristics
Finance Factors	Access to finance	1	5	Having obstacles to access to finance, having a line of credit or a loan from a financial institution, interest rates were not favorable, collateral requirements were too high, and did not think it would be approved.
	Venture capital funds	1	4	Financing through VC, VC funding stage, amount of funding raised, and financing rounds.
Business Environment	Regulation	1	1	Corruption, customs and business regulation, and practices of competitors in the sector.
	Other business environment factors	0	6	Business licensing and permits, copyright protection rules, to find needed skills in the UAE, inadequately educated workforce, availability of data center, cloud solution, and possibility to have an office.
Business Modes	Dominant Technology Component (main IT artifact that is the driver for the digital business model)	0	6	Blockchain, digital platform, robotic process automation, database, marketplace, and decision support system.
	Value Proposition (outlines the value the firm generates for its ecosystem)	2	13	Automation, customization, collaboration, insight, matching/intermediation, financial risk, security, monetary, transparency, convenience/usability, unification/consolidation, text analytics, and natural language processing (NLP).
	Delivery Channel (outlines how the products and services are delivered to the customers)	0	5	API, App, WWW, WWW + App, and Instant Message.
	Customers (describes to whom the firm intends to offer its products and services)	0	3	B2B, B2C, and B2B + B2C.
	Revenue Stream (outlines how the firm is making revenue from its products or services)	0	7	Pay per use, revenue share, sales, subscription, kickback, free, and hybrid.
	Product/Service Offering (outlines what the firm offers to its customers)	2	19	Cryptocurrency, payment service, information aggregation, information extractor, lending community, alternative trading venue, robo advisor, brokerage, currency exchange, current account, financial education, financing, investments, fraud prevention, tokenization, clearing, settlement, compliance (Distributed Ledger Technology (DLT) can enable firms and regulators to monitor transactions in near real-time, improving the process efficiency and transparency for external regulators), KYC, and remittances.

Table 1. Cont.

	Name	Significant Variables	Total Variables	Definition and Characteristics
Control variables	Founder-, firm-, and environment-related factors	2	9	Deliver cost efficiencies, founding teams, age of the founder, COVID-19 impact, academic attainment of founders (master), finance-related experience, technology-related experience, entrepreneurship experience, and partnerships with financial institutions.

Source: Business model taxonomy is based on [42,43] with author review (remittances have been added to “Product/Service Offering” due to its importance in the UAE economy).

Table 2. Excerpt from the OL regression analysis showing the significant financing, regulation, and alignment of strategy with technology factors affecting FinTechs’ success.

	Financing Effects		Financing and Regulation Effects		Financing and Alignment of Strategy with Technology Effects		Financing, Regulation, & Alignment of Strategy with Technology Effects	
	Coefficients	Odds	Coefficients	Odds	Coefficients	Odds	Coefficients	Odds
Finance-related experience	2.553 (2.11) **	12.850	2.879 (1.89) *	17.796	4.330 (3.67) ***	75.964	4.120 (2.15) **	61.575
Academic attainment of founders (master)	1.769 (1.79) *	5.869	1.905 (2.26) **	6.725	1.959 (2.24) **	7.098	2.058 (1.73) *	7.831
Access to finance	−1.057 (−2.89) ***	0.347	−1.586 (−3.06) ***	0.204	−1.332 (−3.68) ***	0.263	−1.778 (−2.88) ***	0.168
Venture capital funds	2.363 (3.00) ***	10.626	3.366 (2.07) **	28.970	2.347 (2.24) **	10.457	3.386 (2.67) ***	29.561
Regulation			−3.716 (−2.40) **	0.024			−3.258 (−2.01) **	0.038
Deliver cost efficiencies					−1.220 (−2.51) **	0.290	−0.798 (−1.18)	0.449
Pseudo R2	0.4019		0.5357		0.4755		0.5616	
LR chi2(2)	23.48 ***		12.36 **		24.44		32.81 ***	
Log Likelihood	−17.474007		−13.564816		−15.323266		−12.808214	

\*  $p < 0.10$ ; \*\*  $p < 0.05$ ; and \*\*\*  $p < 0.01$ . Data in parentheses are standard errors. Source: Created by authors.

**Table 3.** Excerpt from the OL regression analysis showing the significant business model dimensions affecting FinTechs' success.

	Value Proposition Effects		Product Service Offering Effects	
	Coefficients	Odds	Coefficients	Odds
Access to finance	−1.347 (−3.94) ***	0.259	−1.625 (−4.48) ***	0.196
Venture capital funds	2.734 (2.95) ***	15.399	2.751 (3.30) ***	15.671
Regulation	−3.009 (−3.36) ***	0.049	−3.506 (−2.96) ***	0.030
Monetary	3.425 (2.75) ***	38.734		
Security	1.491(1.87) *	4.444		
Robo advisor			2.633 (1.68) *	13.924
Clearing and settlement			3.053 (4.16) ***	21.192
Pseudo R <sup>2</sup>	0.4856		0.5372	
LR chi2(2)	23.83 ***		36.59 ***	
Log likelihood	−16.164297		−14.541035	

\*  $p < 0.10$ ; \*\*  $p < 0.05$ ; and \*\*\*  $p < 0.01$ . Data in parentheses are standard errors. Source: Created by authors.

In fact, despite the financing of VC and the resources provided by ADGM and DIFC, among others, access to finance remains one of the significant obstacles that FinTech founders face. This point was mentioned by several respondents:

*“Bank Account Opening is one of the obstacles that we are facing here, . . . .”* Interviewee A.K.

*“Opening a bank account, the single biggest reason for delay, frustration, and consideration of opening in other countries instead of the UAE for FinTech and all new startups . . . .”* Interviewee T.G.

*“I did not apply for any line of credit or loan . . . .Application procedures were complex... I did not think it would be approved.”* Interviewee A.H.

*“ . . . .Collateral requirements were too high . . . .”* Interviewee M.A.

*“ . . . .Application procedures were complex;... interest rates were not favorable; . . . size of loan and maturity were insufficient.”* Interviewee W.E.

These testimonies indicate that capital availability is key to investment decisions that affect the survival of startups. This suggests that although there is an important amount invested in FinTech, founders still consider financing to be one of the significant obstacles underpinning their growth (Table 2). Other financing means, such as bank loans, have been tested, but were non-significant. This finding implies that it is important to establish and encourage new means of financing FinTech startups to ensure their growth.

## 5.2. Business Environment

The OL regression analysis shows that regulation, as measured by customs and business regulations, practices of competitors in the sector, and corruption, has a negative impact on FinTechs' business performance. Despite creating a RegLab FinTech sandbox and other regulations implemented in Dubai, founders still perceive regulation as one of the main obstacles to the success and growth of their business.

The testimonies of participants did include a reference to the regulation, where interviewees explained the following:

*“ . . . .Cost of setting up . . . . ADGM should ease the cost of establishing at least for gulf residents, or provide installment plans to ease establishing in the UAE.”* Interviewee H.A.

*“ . . . .The costs are higher in the UAE, so we have off-shored the non-client interface roles.”* Interviewee A.N.



*“ . . . . Major obstacles are related to regulation, and all that is related to secure payment, AML.” Interviewee A.N.*

Interviewees highlighted that the limitation imposed by the partial license and the difference in rules and laws implemented in each emirate create confusion and make it difficult to understand the local regulation as one body. The UAE's government bodies are pushing for more developments in the sector and attracting FinTech founders to set up their firms in the region. In fact, the government policy framework is either an advantage for or impediment to innovation and directs the country's development, within which the FinTech industry is constituent.

Interviewee M.C. stated that

*“ . . . . Joining an accelerator helps to have good mentors who support setting up the business, helping to build networking, and, importantly, providing opportunities to raise capital... Pieces of Advice and guidance that I received from mentors were valuable and helpful . . . .” Interviewee M.C.*

*“ . . . . participate in a bootcamp startup or an accelerator that will save time and money . . . .” Interviewee M.S.*

Other business environment criteria (e.g., 'possibility to have an office', 'business licensing and permits', 'inadequately educated workforce', 'to find needed skills in the UAE', and 'right protection rules') were considered and tested, but none of them were statistically significant.

### 5.3. Business Model

The empirical findings indicate that the FinTech business model component “product/service offering” dimensions have an unequal impact on a FinTech venture's potential success. Therefore, FinTechs in certain categories seem to achieve a higher performance and attract greater investments than others.

An in-depth view of the regression for the specific dimensions shows that 'robo advisor' and 'clearing and settlement' payments are positively significant. All other dimensions, such as credit lending, financing, information aggregation, fraud prevention, and NYC, among others, are not statistically significant.

Surprisingly, a 'payments' and 'remittances' service does not appear to be significant, while the UAE has been a driving force in remittances due to its broad expatriate population, representing around 90% of the country's total population. This result suggests that a further investigation on the impact of the remittance service provided should be conducted. According to [16], 85% of the FinTech firms in MENA countries are operating in payments, transfer, and remittances sectors. Reference [43] identified that product-specific factors represent crucial FinTech venture success determinants to generate competitive advantages.

The results reported in Tables 2 and 3 show that the FinTech companies that are more likely to succeed have a “value proposition” monetary and security dimension.

Other dimensions, such as automation, collaboration, customization, insight, matching/intermediation, financial risk, transparency, unification/consolidation, convenience/usability, text analytics, and natural language processing (NLP), have no positive impact or are not significant.

### 5.4. Other Factors

A number of factors with a positive and significant impact on FinTechs' success and growth emerged from this study, particularly the human capital, specifically, the academic attainment of founders: Second academic degree (Masters) and finance-related experience. Other variables were introduced as control variables, but appeared to be insignificant (e.g., technological capital, firm characteristic stated by the size of the founding team, and age of funders [35]).

Interviewee M.A. stated that entrepreneurial education is an important factor:

*“Schools and universities must have a more in-depth focus on Entrepreneurship, Venture Capital, and general training on how companies are built. Most young people in the UAE do not even know where to start due to the lack of guidance. Secondly, fear needs to be eliminated, and this is instilled by expat parents which is the result of general conditions in the UAE, such as fear of losing a job, which will lead them to lose their Visa status, which will lead to them not being able to sponsor their families and so forth. Given this scenario, some more info sessions are required, even on the legality front. For instance, young people need to know that it’s okay to be unemployed and to do their own thing, and here is how you can do it...” Interviewee M.A.*

The COVID-19 pandemic has adversely affected many FinTech companies; although it was tested, the impact was insignificant. Interviewee O.B. reported that

*“... .., during may the first 10 days exceeded 1 million.... the transaction volume is multiplied by 4 during COVID- 19 period.” Interviewee O.B.*

Interviewee J.A. stated that

*“... .. We are fine and will come out stronger.” Interviewee J.A.*

FinTech firms with a small size compared to legacy financial institutions have the flexibility to adapt to new market dynamics. The following quotations are illustrative of this:

*“... To survive the current COVID-19 outbreak ... .., we pivoted the product and added another service.” Interviewee T.G.*

*“... ..We have quickly made changes to our product suite and made digital companies like our Target Market.” Interviewee A.N.*

This is in alignment with the findings of [45], indicating that perceived benefits significantly affect the intention to use FinTech solutions.

## 6. Discussion

The UAE’s government has made significant progress in providing regulatory support for FinTechs and implementing several initiatives to help foster the growth of ventures in this field. DIFC and ADGM have FinTech support structures in place, including sandboxes. These, combined with startup innovation funds to support the environment, have been a big part of developing the UAE’s FinTech ecosystem in recent years, with a growth rate of 30% [16]. The UAE is leading the MENA’s FinTech market, representing 47% in 2019 [17]. Reference [46] stated that MENA’s FinTech market will top USD 2.5 billion by 2022. Recently, reference [47] announced that the UAE would be reaching a high-record of USD 2.5 billion by 2022.

Reference [48]’s finding supports public policies, including, but not limited to, the creation of incubators, hubs, grants, and mentoring programs relevant in the FinTech industry. Research endorses that country-specific determinants, including GDP growth, economic freedom, financial development, and R&D expenditure, are statistically significant for startup funding [48–50].

In fact, both ADGM and DIFC attract founders from abroad, allowing them to take advantage of all the key elements that support FinTech innovation in a unique location; accelerators play a vital role. Both have access to significant markets in financial services, and both have investors who are providing funding to FinTech startups. They have regulators and governments who are actively supporting innovation and growth of the sector.

ADGM and DIFC accelerators for FinTech startups provide a range of early-stage support, both financial “VC” (early-stage funding) and non-financial; reinforced by the role of ADIO in financing through the Ghadan fund.

This research results confirm the positive impact of VC. In fact, three local venture capital firms focused on FinTech have emerged in the UAE since late 2017 (Appendix A) and have contributed to the success and growth of FinTech firms. Most of the funds have strategies aligned with the initiatives set out by regulatory bodies in the UAE to

encourage and expand FinTech innovation. According to [17], 37 investors invested in FinTech startups in 2019, with regional investors accounting for 86% of them. However, 41% of these investors had not previously invested in FinTech ventures, showing an increasing appetite and raising the potential pool of capital available for FinTech.

Available financing mainly provided by VC has supported the establishment of FinTech and contributed to their business growth. Reference [48] revealed that FinTech funding determinants have a similar magnitude and direction to those of startups. Entrepreneurs that attempt to found FinTechs in emerging markets will face more constraints in uncertainty or credit availability. Capital availability is key to investment decisions, which in turn affect the survival of startups.

These results are in alignment with the findings of [51–56]. Government policies have an impact on financing startups, which lead to growth and success. Governments' policies related to funding are capable of fostering or retarding the financing of entrepreneurs' businesses.

To develop the UAE FinTech sector in the long term, there is a need to consider facilitating access to financing, which was one of the major obstacles highlighted by interviewees. Funding for expansion is a key challenge for FinTech in terms of scaling up their businesses. The UAE's policies in this regard will be the fuel of this sector. This is in line with [57]. Applying a qualitative methodology, in-depth interviews were conducted with 27 business owners. The results revealed that financial barriers, difficulties accessing bank financing, and legal issues have a detrimental impact on small and medium enterprises' (SMEs) growth. The authors concluded that policy-makers in the UAE should send a signal for lending institutions to consider strategies that provide access to affordable financial services to satisfy SMEs' needs. Reference [58] also sheds light on the challenge related to access to finance.

References [59–61] used funding received as a metric of interim success as startups are more likely to survive when they have access to capital. This is in alignment with the results revealing capital availability as key to investment decisions, which influence startups' survival.

As the FinTech industry grows, the regulatory environment will continue to be a focus point within the industry. Despite the fact that UAE regulators have implemented sandboxes to create a FinTech ecosystem, which has been empirically demonstrated as effective in different countries across the world [11], the findings of this research revealed that regulatory barriers remain one of the major obstacles to the growth of FinTech ventures.

Adequate and possibly unified regulation (ADGM and DIFC) can provide a significant opportunity to use regulation as a competitive advantage in FinTech, instead of being perceived as an obstacle. Alternatively, ADGM and DIFC, having several traits of the regulatory actions specific to FinTech, can increase their potential for success by having solid controls in place, highlighting the difference of their regulatory approach, enhancing the competitiveness of FinTech technology and attracting more businesses in this field.

Reference [38] demonstrated that entrepreneurship is a function of knowledge stock accumulation and spillover that promises success opportunities and obstacles, such as risk aversion, legal restrictions, and bureaucratic hurdles; that is, actors might decide against starting up because of the unfriendly business environment.

The findings revealed that regulators need to work closely with FinTech startups to help innovators understand the regulatory environment. In the same context, there is a need to ensure a balanced regulation to build trust, ensure sustainability, and encourage growth. In particular, FinTechs pose a challenge to the relevancy of the existing financial regulation [4]. This may appear a serious concern knowing that FinTechs are still subject to less regulation than traditional finance and banking, particularly with the new generation of risks having potential implications for the financial system's overall soundness [19].

Furthermore, the majority of FinTechs are operating in other countries, so they act as ambassadors for the FinTech UAE business environment. The government is putting significant effort into attracting this business worldwide; it is very important to main-

tain this effort. As argued by [54,56], government policies are powerful influencers of entrepreneurial activity, structurally strengthening the business ecosystem, and thereby encouraging certain activities that will favor one class of startups that fall within investment criteria and disfavor another (leading to the loss of investment opportunities).

There is a clear need for ADGM and DIFC to collaborate and position the UAE as a gateway to MENA and West Asia. This will help to ensure a sustainable and growing market demand and improve confidence. However, internally, these institutions might enhance and develop standards that help FinTech firms partner more easily with established financial service providers.

The analysis revealed that internal market openness to MENA and Asia is essential to FinTech startups for acquiring new markets and ensuring a growing demand for their financial products or services. The level of transparency of a country's internal market is a gateway to drawing in external investment and customer demand opportunities, motivating FinTech startups to outperform rivals [62].

The finding indicated that ADGM and DIFC (through Hubs) need to be strongly associated with universities, both local and international, which provide highly-skilled people and an early development environment for new technologies. There are concerns about reliance on foreign talent: A collaboration with the local education sector to embed teaching about FinTech\_ Developing new modules on FinTech\_ into existing finance degrees, in particular Master's degrees, and other programs (e.g., Computer Information Sciences programs). This is potentially a quicker way to upskill students and get them ready to work with FinTech.

A good example can be obtained from the USA, where the government launched an initiative—Startup America—intended to promote entrepreneurship and accelerate the transfer of research findings from universities to businesses, enhancing the regulatory environment for setting up and expanding new businesses, and increasing connections between entrepreneurs and talented business mentors [55]. Allocating vs. increasing spending on research and development in the finance domain can strengthen and maintain the FinTech industry's sustainability. This will contribute to creating a suitable environment enabling more FinTech firms to propose highly innovative and competitive products.

The fact that government policies have made provisions for setting up an ecosystem that promotes FinTech startup growth can give rise to periodical quality innovation. However, in the UAE, the FinTech industry is still relatively nascent; the business model component “product/service offering” does not seem to be the major factor playing a significant role in the ventures' success. This poses the question of whether further insights can be gained by directly relating FinTech venture success to other elements.

The human capital appeared to be of high importance. These results are in alignment with the findings of [50], where the educational and professional experience of the founding team served as signals of positive returns and attracting venture capital attention.

The current context has been considered, where several founders indicated that the COVID-19 pandemic has sped up digital readiness and accelerated the volume of digital payments. In fact, the majority of UAE private and public organizations have expanded their digital activities, which has led to a rise in digital payments. In this context, reference [63] indicated that the COVID-19 outbreak will accelerate digital and technology transformation to meet demand shifts. Reference [63] also highlighted the need to create an adaptive learning ecosystem to upskill and reskill by building digital capabilities at scale.

## 7. Conclusions

The FinTech industry is gaining shape and has a significant impact on the financial industry, especially in payment, wealth management, crowdfunding, lending, capital market, and insurance. Recognizing the disruptive effect of FinTechs, the UAE's government has set a policy direction to steer the financial sector towards a greater adoption of critically-destructive technologies. The emergence of innovative approaches to delivery services and new products, channels, and business models has transformed the financial services indus-

try. Increased customer awareness and expectations, digitalization, favorable regulation, and cost efficiency pressures have magnified the effect of disruption by FinTechs.

This study contributes to the entrepreneurship literature in general and the FinTechs venture literature by linking the success of ventures combining finance with technological innovation. The empirical analysis explores a different dimension of FinTech entrepreneurship. There are limited data, specifically, data on the roles that various aspects of finance, the business environment, and the business model play in the success of FinTechs.

By analyzing a dataset of 32 surveys conducted with FinTech business owners, the study shows several critical incentives that the FinTech sector is significantly related to. These incentives have arisen from the business and regulatory environment, and the availability of financial resources, with the specific role of VC. Additionally, business model components that determine the success of FinTech startups have been identified. The empirical study shows that the UAE's government bodies have a major role in ensuring the growth of FinTech firms.

This research has provided insight into the underlying attributes that may be relevant to those contributing to strengthening FinTech startups' success. These are facilitating access to financing, enhancing the role of VC funding, and improving the regulatory environment, specifically, customs and business regulations, practices of competitors in the sector, and corruption.

On the other hand, the regulators and providers of finance services may expand the scope of cooperation with Fintech entrepreneurs to provide business growth to these entities. The ultimate goal is to achieve greater financial inclusion at the community level, in pursuit of a greater efficiency and stability of the financial system.

Additionally, policy shall construct effective and appropriate ways of deepening further interest in combining entrepreneurship, technology, and innovation in finance, especially in the tertiary education sector. This paper proposes formalizing the role of the financial system in the development of the innovation mechanisms capable of enabling entrepreneurs to diffuse outcomes of innovation and commercialization of technology in finance.

However, the study reported here has some limitations. Critically, while the data show that "value proposition" and "product service offering" effects are associated with the success of FinTech firms in the UAE, it cannot explain why this is the case. Indeed, this study cannot explain the reasons for any of the results. Further research will determine the mechanisms underlying the results of the role of the FinTech business model investigated in this study. Additionally, the relatively small size of the sample is a potential limitation in this study. Further research considering a larger sample and the type of activities could produce more accurate results by conducting a comparative analysis.

While this study goes a long way in filling gaps within the existing literature on FinTech in the Middle Eastern state in particular, it opens up numerous avenues for further research. The most possible immediate expansion would be to include FinTech firms in other countries. It would be interesting to see how the success of these firms may change based on the important regulatory, financing, business environment, and economic changes. Additionally, the different sources of external finance should not be neglected and should be incorporated in future studies in order to identify the vital factors in measuring the optimal financing alternative to help FinTech entrepreneurs to select the best financing source, and so to ensure their business sustainability and growth.

Apart from businesses financing perspectives, a couple of topics related to regulation deserve further investigation, including whether and how different FinTech local regulators can better coordinate and communicate to enable the effective regulation of financial services across different emirates. Moreover, a novel research area is exploring the variety of potential regulatory responses to better address the need of FinTech firms and proposing adequate rules to guide this industry.



**Author Contributions:** Conceptualization, H.Z. and T.E.G.; methodology, A.B. and T.E.G.; investigation, H.Z.; validation, A.B. and T.E.G.; formal analysis, H.Z.; writing—original draft preparation, A.B. and T.E.G.; writing—review and editing, A.B. and H.Z. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Data Availability Statement:** Not applicable.

**Acknowledgments:** This research was supported by Abu Dhabi Securities Exchange (ADX). The authors are grateful to Messrs A.A. ALNeaimi and Y.S. ALSulaimani for encouraging an environment conducive to academic research. O.S. ALSarkal is gratefully acknowledged for his technical assistance.

**Conflicts of Interest:** The authors declare no conflict of interest.

## Appendix A

**Table A1.** The UAE FinTech Ecosystem: An overview.

UAE's National Visions and Strategies	
UAE's National Vision 2021: Calls for the UAE to become a knowledge-based economy and "among the best in the world in entrepreneurship."	Ministers of Artificial Intelligence and Advanced Sciences (2017). Creation of tech-focused institutions (Smart Dubai, Abu Dhabi Digital Authority, and the Dubai Future Foundation) and launch initiatives (Takamul Program, TIP-Technology Innovation Pioneer, Hub71, Area 2071, to support entrepreneurs in various technology-related verticals). The U.S.-U.A.E. Business Council drove a trade mission for US firms focused on building partnerships with the UAE government and business entities in the FinTech domain (2019).
Emirates Blockchain Strategy 2021: Launched by the UAE government	The strategy aims to perform half of the government transactions using blockchain technology within three years. This involves e-payment services, offering an opportunity for FinTech firms to be involved (2018).
Implementation of the National Artificial Intelligence Strategy 2031 (2019)	This strategy was led by the UAE Minister of State for Artificial Intelligence by investing in the latest AI technologies and tools, including AI applications to FinTech.
Tomorrow 2021 (2018)	The three-year vision includes 50 initiatives backed by USD13.6 billion. Budget for the Abu Dhabi Government Accelerators Program (Ghadan 21). The movement to develop FinTechs is part of this greater effort.
Government and regulatory agency support	
Establishment of a dedicated FinTech office by the UAE Central Bank (2019)	FinTech office aims to develop national regulations for financial technology firms.
Financial Free Zones	
Dubai International Financial Centre (DIFC): Established a number of partnerships to create favorable environments in which FinTech startups can flourish.	Regulatory Sandbox models known as the DFSA Innovation Testing Licence (ITL) Program, which entitles ITL holders to test advanced and innovative financial products, services, and business models (launched in 2017). Partnership with US consulting company Accenture to further promote innovation at the FinTech Hive and facilitate collaboration with Accenture's FinTech Innovation Labs around the world (2018). Many other partners include AWS, Careem, Cigna, EmiratesNBD, FAB, K&L Gates, MetLife, Microsoft, Standard Chartered, and Visa. DIFC FinTech Fund announced in 2017 with committed capital of USD 100 million. DIFC FinTech Hive Startupbootcamp. DIFC FinTech Hive launched in January 2017, creating a collaborative ecosystem providing flexible co-working spaces and access to a financial community: Hive seeks to enhance and encourage innovation in the region and bring cutting-edge financial services technologies to the Middle East through a 12-week accelerator program where startups can develop and experiment with their solutions under the mentorship of delegates from the main local financial institutions.

Table A1. Cont.

UAE's National Visions and Strategies	
Abu Dhabi Global Market (ADGM)	<p>Creation of a RegLab FinTech sandbox, which is a specially-tailored regulatory framework that provides a controlled environment for FinTech startups to develop and test their innovative solutions (announced in 2016).</p> <p>ADGM Academy, part of ADGM, is working with global experts to build a high-quality financial education portfolio.</p> <p>Partnership with Plug and Play, the Silicon Valley accelerator. It opens a new office in Abu Dhabi and brings some of its top startups.</p> <p>Annual FinTech Abu Dhabi Festival (2017, 2018, 2019, and 2020) invites applications from FinTechs to participate in the FinTech Abu Dhabi Innovation Challenge.</p> <p>FinTech-related investment fund: (i) Abu Dhabi Catalyst Partners; established in April 2019, with committed capital of USD 1 billion, and direct investment in FinTech, and (ii) Ghadan Ventures Fund, launched in May 2019 with committed capital of USD 146 million (fund to increase the access to financial resources for Abu Dhabi-based startups, including FinTechs).</p> <p>Member of the Global Financial Innovation Network (GFIN), which aims to facilitate collaboration between regulators and help FinTech companies test cross-border solutions (launched in January 2019).</p>
Private Sector Partnerships	
Partnerships with banks	<p>ADCB partner with Plug and Play and ADGM to join Plug and Play's global ecosystem,</p> <p>Emirates NBD partners with DIFC FinTech Hive to certify FinTech startups who have successfully used Emirates NBD's Application Programming Interface Sandbox to develop innovative financial solutions.</p> <p>FAB and Abu Dhabi Digital Authority collaborated to launch the Abu Dhabi Government Digital Payment platform (ADPay) to ease electronic payment for customers and investors in the UAE (2018).</p> <p>Hive's corporate partners include Accenture, AIG, AXA, AWS, Cigna, Emirates Islamic Bank, First Abu Dhabi Bank, Microsoft, HSBC, Standard Chartered, Visa, MetLife, Zurich, and Finabl.</p>
US financial service companies have embraced the UAE's FinTech space.	<p>Amex: In 2019, Amex rolled out a corporate accelerator where FinTech startups were challenged to find solutions to specific problems.</p> <p>Citi: In 2019, Citi held its first MENA FinTech Challenge, which provides the region's FinTech community with the opportunity to convert their ideas into practice and advance solutions around selected problem statements.</p> <p>Mastercard: In 2018, Mastercard initiated its first Start Path Summit in Dubai. The event brought together FinTech startups pitching their innovative financial services solutions.</p> <p>MetLife and PayPal: MetLife Foundation, PayPal, and Village Capital selected early-stage ventures for the Finance Forward (MENA 2019 accelerator program)</p> <p>Visa: Visa collaborated with two local FinTech accelerators in the UAE from inception—the DIFC FinTech Hive and Startupbootcamp. Since 2019, Visa has been enlarging its global FinTech Fast Track program to permit both new and established FinTech firms to issue digital payment solutions by strengthening the Visa network's speed, security, reliability, and global reach.</p>

Note: Free zones are geographically demarcated areas within the UAE across Dubai, Abu Dhabi, Sharjah, Fujairah, Ajman, Ras al-Khaimah, and Umm al-Quwain. They encourage new business and attract foreign investment. They are, in most cases, dedicated to a specific industry. Accordingly, each free zone complies with special laws regarding the minimum capital requirements, office or warehouse space, and permitted activities. In this context, financial free zones (FFZs) are free zones engaged in financial activities. There are currently two FFZs: Global Marketplace Abu Dhabi (ADGM) and Dubai International Financial Centre (DIFC). Source: Created by authors.

## Appendix B

**Table A2.** Excerpt from the questionnaire.

FIRM CHARACTERISTICS	
Field of activity: (Tick where appropriate)	1. Payment/Billing 2. Wealth management 3. Crowdfunding 4. Lending 5. Capital markets 6. Insurance services 7. Regulation 8. Blockchain/Crypto: Companies leveraging blockchain technologies for financial services 9. Mortgage/Real Estate: Mortgage lending, digitalization, and financing platforms 10. Money transfer/Remittances: International money transfer and traking software
PERCEPTION OF SUCCESS: HOW DO YOU MEASURE SUCCESS OF YOUR FINTECH	
Please indicate how do you perceive the performance of your establishments?	1. Not at all successful 2. Fairly not successful 3. Fairly successful 4. Very Successful
HUMAN CAPITAL OF THE FOUNDERS AND MANAGERS' CHARACTERISTICS	
Academic attainment of founders: (Tick where appropriate)	1. No academic degree 2. 1st academic degree (bachelor) 3. 2nd academic degree (Masters) 4. Doctors/professors (PhD)
Entrepreneurship/Finance/Technology-related experience.	YES/NO by type of experience If YES, number of years ———;
VENTURE CAPITAL (VC)	
If VC is the main source of capital, how many VC investors?	.....
If VC is the main source of capital, what is the current funding stage that your startup is at? (Tick where appropriate)	1. Seed Round 2. Series A Round 3. Series B Round
How many investing/financing rounds you participated in time since first funding?	.....
ACCESS TO LOANS AND FINANCE	
Does this establishment have a line of credit or a loan from a financial institution?	Startup year: Yes/No Current year: Yes/No
If Yes, how much time that takes from the request date to receive the money?	.....
If No, what was the main reason why this establishment did not apply for any line of credit or loan? (Tick where appropriate)	1. No need for a loan—Establishment had sufficient capital 2. Application procedures were complex 3. Interest rates were not favorable 4. Collateral requirements were too high 5. Size of loan and maturity were insufficient 6. Did not think it would be approved 7. Other
OBSTACLES TO FINTECHS DEVELOPMENT (BUSINESS-GOVERNMENT RELATIONS)	
	No obstacle      Minor obstacle      Moderate obstacle      Major obstacle      Very severe obstacle      Does Not Apply      Don't know
Access to finance	
REGULATION	
Corruption	
Customs and business regulations	
Practices of competitors in the sector	

Table A2. Cont.

OTHER BUSINESS ENVIRONMENT FACTORS	
Inadequately educated workforce	
To find needed skills in the UAE?	
Availability of data center/Cloud Solution	
Business licensing and permits,	
Copyright protection rules,	
Possibility to have an office.	
BUSINESS MODEL: TAXONOMY DIMENSIONS AND THEIR RESPECTIVE CHARACTERISTICS	
Business dimensions characteristic are presented in Table 1.	
Based on [44] and revised by authors.	
OPEN QUESTIONS	
Are there any specific barriers to setting up your Fintech start up? Any specific to UAE?	
Do you have any recommendation to overcome/ease the barriers?	
To what extent is your firm's activity (in terms of turnover) affected by the current COVID-19 outbreak? Please choose a single option	
How do you will react in order to survive the current COVID-19 outbreak?	
Note: We restrict this short documentation of the questionnaire to the variables used in the analysis. Source: Survey, elaborated by authors, based on [27,43,64,65].	

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