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Physical and virtual incubators and early-stage start-ups in Ogun State, Nigeria

Abstract: Business incubation is one of the mechanisms to reduce the rate of small business failure and support vibrant start-up businesses in developing countries like Nigeria. This study therefore aims to investigate the impact of physical and virtual incubators on early-stage start-up businesses in Ogun state, Nigeria. A descriptive research design and purposive sampling technique were employed for this study with 152 early-stage start-up businesses within the Ijebu-North Local Government area of Ogun state covering the major towns of Oru, Ilaporu, Awa, Ago-Iwoye, Ijebu-Igbo and Mamu forming the sample for the study. Empirical findings show that a positive and significant relationship exists individually between physical and virtual incubators and early-stage start-ups in Ogun State, Nigeria. Furthermore, the combined effect of physical and virtual incubators has also revealed a positive and significant relationship with respect to these start-ups. The study concluded that physical and virtual incubators have significantly transformed the landscape in Nigeria, playing instrumental roles in nurturing and accelerating their growth. It is recommended that stakeholders, including government agencies, private investors and corporate entities should continue to invest in physical and virtual incubators to expand their reach and capacity. In addition, those providing incubators should tailor their support services to the specific needs of Nigerian start-ups, taking into account the unique challenges they face, such as limited access to funding, infrastructural deficits and regulatory hurdles.

Keywords: incubation; innovation; micro-scale enterprises; physical; start-ups; virtual

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Introduction

In recent years, Nigeria has witnessed a burgeoning start-up ecosystem, fueled by a wave of innovation and entrepreneurship across various sectors. Central to the support

structure for these early-stage ventures are physical and virtual business incubators which serve as nurturing grounds, providing essential resources, mentorship and networking opportunities to nascent start-ups. In Nigeria, where the entrepreneurial spirit runs deep but infrastructural and systemic challenges persist, the role and impact of these incubators are paramount in shaping the success trajectories of budding ventures. For example in Poland, an organization named Weexpert provides a platform for budding entrepreneurs to overcome legal and institutional challenges faced by start-ups. Their services include providing legal and tax advice, helping to reduce expenses on payment and administration for IT and digital specialists as well as out-staffing services to firms of all sizes. Another Polish organization, BiznesExpert, provides comprehensive services for relocating businesses to Poland and legalizing freelancing. Their own services include collaborating to nurture business ideas, provision of services for the legalization of foreigners residing in Poland, and the registration of legal entities, foreign company branches and entrepreneurship.

Business incubation is one of the strategies employed to curtail small business failure and supports vibrant businesses that help drive the national economic development (Wonglimpiyarat, 2016). The incubation program has been widely seen as a significant policy mechanism to support regional innovation and economy (Wonglimpiyarat, 2016; Lukeš et al., 2019; Pustovrh et al., 2020). Business incubators are important platforms to support incubation programs (Baraldi & Havenvid, 2016; Diez-Vial & Montoro-Sanchez, 2017; Xiao & North, 2018) and are seen as important facilitators for innovation by providing office space, equipment and mentoring services, as well as financial, legal and administrative support for technology entrepreneurs and start-up companies (Wang et al., 2020).

A number of studies in the literature have emphasized the role of incubators in entrepreneurial activity (Theodoraki, 2020; Audretsch et al., Belitski & Cherkas, 2021; Sohail et al., 2023), and on the impact of the incubation process (Albort-Morant & Ribeiro-Soriano, 2016; Mas-Verdú et al., 2015). With the number of business incubators worldwide growing exponentially, it is essential to understand the processes which have resulted in an increase in survival and growth, and which can become an effective mechanism for knowledge spillover for entrepreneurship, creativity and innovation (Belitski & Desai, 2016; Audretsch & Belitski, 2022; Ogunmuyiwa & Onanuga 2022; Startupblink, 2023; 2023, 26 January). Business incubators are recognized as essential for promoting social development and sustainable economic growth across a range of industries (Zahra & Wright, 2016; Sansone et al., 2020). These structures hold the ability to increase entrepreneurship, technology and innovation, as well as creating new employment opportunities that lead to wealth generation (Ririh et al., 2020) allowing a variety of support and offering a range of services to bolster new ventures, established companies or entrepreneurs, while safeguarding their survival and expansion during challenging times (Vaz et al., 2023).

Nonetheless, incubators refer not only to the provision of office buildings and infrastructure but also include networks of individuals and organizations, including incubator managers and staff, marketing specialists, venture capitalists, incubatee companies and employees, industry contacts, professional services, local universities and volunteers (Raflis et al., 2022). Business incubators serve as a mechanism for the creation of new ventures, provide legitimacy and networks, increase community support and offer platforms for building a client-based environment, creating perceptions of reduced risk and increased security within the given physical space (Hewitt & van Rensburg, 2020).

The emergence of physical and virtual incubators has significantly influenced the landscape of early-stage start-ups in Nigeria. However, despite their proliferation, there remains a gap in understanding their precise role and impact these incubators have on the success and growth trajectories of start-ups in the Nigerian ecosystem. Micro-entrepreneurs play a crucial role in Nigeria's economy, contributing significantly to employment generation, poverty reduction and overall economic growth. However, micro-entrepreneurs' businesses often face challenges in terms of limited access to resources, low levels of innovation, and insufficient support systems. Innovation in incubation has emerged as a potential solution to address these challenges by providing a nurturing environment, mentorship, and access to resources for start--ups and small businesses. Despite the potential benefits of business incubators, there is a lack of comprehensive research on their impact on the performance of micro-businesses in Nigeria.

Micro-entrepreneurs, comprising a substantial portion of most economies, particularly in developing countries, face significant obstacles to growth, productivity and competitiveness due to limited access to resources, inadequate infrastructure and minimal skill development. Meanwhile, business incubation and innovation, proven catalysts for economic advancement in the formal sector, have received limited attention and application within the informal economy. This critical gap in understanding the effectiveness of business incubation and innovation as drivers of micro-entrepreneurial performance hampers the realization of inclusive and sustainable economic development.

Thus, the objective of this study is to investigate the impact of physical and virtual incubators on early-stage start-ups in Ogun State, Nigeria. The rest of the work is broken down into three sections: section two (2) is a review of relevant past studies, while section three (3) is focused on the methodology and empirical results. Section four (4) is dedicated to the conclusion and recommendations.

Review of relevant literature

Concept of business incubation

The incubation concept is founded on the objective of increasing the growth and survival of firms by formulating mechanisms to ensure the early identification of those with great success potential that are restricted by the various typical constraints. Thus, the incubator concept ensures that targeted firms are able to overcome the liabilities derived from being new and small. Inevitably, profitable and sustainable ventures can be developed in the future (Ayatse et al., 2017). Hausberg and Korrecks (2018) defined business incubators as business-incubating organizations that support the establishment and growth of new businesses with tangible and intangible resources throughout a flexible period with funding by a sponsor (government or corporation). Meanwhile, Pauwels et al. (2016) had defined incubation models as the way an incubation entity provides support to start-ups to improve the survival probability of portfolio companies and accelerate their development.

In 1988, however, it had been defined as being a link to technology, capital and knowledge to accelerate the growth of new companies and speed up technology transfers. Thus, a business incubator was defined as the physical location that provided a specific set of services to individuals, entrepreneurs and small companies. Originally, business incubators were defined as facilities that assist the early-stage growth of new start-ups through different services (Hassan, 2020) helping to foster innovation among start-up enterprises

and enhance entrepreneurial activities. In addition, the incubator was recognized as a type of organization specifically designed to accelerate growth and ensure the success of entrepreneurial projects through a wide range of resources and business services, usually based in educational institutions (Zapata-Guerrero et al., 2021).

The concept of business incubation also refers to a concerted, systematic effort to nurture new firms in the early stages of their activity in a controlled environment. It offers the combination of infrastructure, development-support processes and the expertise needed to protect against failure and steer incubatee firms' growth performance (Theodorakopoulos et al., 2014). Hackett and Dilts (2004) developed the business incubation process based on the "black box concept." The emphasis was on the relation between the events occurring inside the incubator (the internal dynamism) and its external environment. Business incubation involves a selection of incubatees from a pool of prospective candidates to enter the black box of incubation. The incubatees would undergo value-added activities in three ways: selection performance (select weak but promising firms), monitoring and business assistance intensity, and resource support. Later, the incubatees would be released from the black box as financially viable and resilient firms on the market (Sohail et al., 2023).

As a result, incubators become a tool for policymakers to promote economic development and innovativeness and to catalyze the growth of new technology-based firms through the provision of services such as: (i) access to debt and equity capital to launch and sustain the growth of clients; (ii) the establishment of linkages with venture capital and corporate equity investors through capital networks, brokers and personal contacts; (iii) provision of quality in-house equity and debt funds to seed deals and financing gaps; (iv) creating relationships with corporations willing to provide services e.g. manufacturing, product development, sales and distribution (Dhochak et al., 2019).

Virtual and physical incubators

The term virtual incubator was firstly initiated by Nowak and Grantham (2000) and further used as a theoretical lens by Mian et al. (2016) as an one that provides knowledge brokering to develop innovative start-ups. In Persada et al.'s (2019) research, they further contributed to the virtual incubator framework, with a developed holistic approach to an online platform as the electronic incubator (e-incubator). The virtual incubator does not necessarily have to be in the same geographic area as the program participants, and frequently provides a more cost-efficient program with more significant flexibility. Specifically, in rural areas or larger cities where commuting is troublesome, the virtual incubator can act as a good substitute.

The virtual incubator, according to Bonacina Roldan et al. (2018), comes with some challenges, however. It is more challenging to encourage networking amongst participants, which may lead to less knowledge sharing, with a lower number of collaborations and future partnerships.

Virtual incubators extend services to those outside the physical incubator through electronic networks. Thus, electronic payment systems have become new channels for financial transactions driving business around the world (Ogunmuyiwa & Amida, 2022). For example in Poland, the Polish government through its websites has allowed start-ups and upcoming businesses the opportunity to link up with gov.pl. With this, businesses can reinforce their reputation as legitimate entities operating within the country. This credibility is especially important for industries such as finance, healthcare, legal services,

or any sector where trust plays a significant role in consumer decision-making. Another key benefit of utilizing gov.pl in Poland is the enhanced visibility it provides to businesses within Poland. Government websites often receive high traffic due to their authority and relevance to citizens' needs. By listing your business on gov.pl or linking back to your website from relevant government pages, you can tap into this existing source.

Physical incubators have, however, been observed to be more successful than virtual incubators (Sanga & Mselle, 2018) and their strength lies on their spatial proximity to universities and research institutions (Vyakarnam & Myint, 2011). The services offered in the physical incubators could be likened to the moral and spiritual willingness of skilled craftsmen to work with unskilled and semi-skilled workers though the unskilled may not necessarily be interested in acquiring knowledge (Sanga & Mselle, 2018).

Technologically, an incubator covers physical or virtual spaces upon which newly discovered technology is nurtured before being transferred to industries for commercial application and in terms of entrepreneurship. The term business incubator is generally used in relation to nurturing entrepreneurial skills whether in physical or virtual spaces or otherwise. Business incubators therefore, describe a wide range of ubiquitous and heterogeneous institutions that operate in different contexts and with diverse objectives (Scillitoe & Chakrabarti, 2010; Schwartz, 2013).

In summary, virtual incubators do not offer the positive effects of local synergy between similar start-up companies obtained through face-to-face networking and problem-solution sharing. Also, start-ups do not have a running start to their business life involving secretarial or infrastructure support. However, virtual incubators are able to offer a greater advisory network to their incubatees, better matching the supply and demand of management and technical talent.

Empirical studies on business incubators

The incubator concept is different from the industrial park (Hewitt & van Rensburg, 2020), in fact, some large industrial parks include them. Business incubators promote the idea of shared administrative services, management support, linkages to capital funding sources and a conducive environment for small business cooperation and growth (Shepard, 2013). Business incubators provide support, especially to MSEs in the intermediate technology sector that require certain resources and capabilities to support the generation of competitive advantages and ensure sufficient sales levels (Zapata-Guerrero et al., 2021).

In addition, in a study conducted by Zapata-Guerrero et al. (2021) in Mexico on the efficiency of the incubators, from a double-managerial approach (incubator and start-ups), measured the efficiency oriented to the survival growth in employment using 25 business incubators at a university between 2012 and 2014. The study found that just one of the three years was found to be the most efficient and, in addition, 13 of the start-ups were found to be the most efficient.

In another study was conducted by Sansone et al. (2020) in Italy on incubators that mainly support start-ups with a significant social impact. The work employed a survey of 162 incubators active in Italy, and a total of 88 responses were received. From their analysis, three types of incubator were found (business, mixed and social). It found that social incubators perceive social impact measurement, training/consulting on business ethics and CSR as being more important than in other incubator types.

Theodoraki et al. (2020) also studied the effects of the entrepreneurial ecosystem and co-opetition strategy on incubator performance in France sourcing data from 156 incubators. Empirical findings revealed that co-opetition significantly improves incubator performance and that the entrepreneurial ecosystem has a moderating role between incubator strategy and performance.

As business incubators are among the important mechanisms to support entrepreneurship and develop entrepreneurial projects, entrepreneurship calls for innovation and change and is considered a real engine for economic and social development, still the best hope for any country to prosper. With societies seeking to meet the requirements of employment, the importance of caring for a new generation of entrepreneurs, where young talents and creative ideas abound, just looking for someone to take and develop them (El Talla et al., 2017).

Shehada et al. (2020) believe that the importance of a business incubator lies in its prominent role in economic and social development through: (i) encouraging and developing small and emerging projects, business incubators were mainly established with the aim of helping these projects and providing the necessary support to them. This helps them to overcome the difficulties facing projects at the beginning of their establishment, due to lack of experience and the absence of the planning and advisory side; (ii) economic and social development, where business incubators contribute to the revitalization of a local community through setting up projects and supporting the business environment, and considered as a center for spreading entrepreneurial thought among young people. We do not lose sight of the fact that activating self-employment and setting up projects in any city or region contributes to promoting economic development. By reducing unemployment rates, increasing the number of companies that pay taxes to the state, they also stimulate production, and import and export operations, all of which ultimately are in the interest of the state.

Xiao and North (2018), while conducting a study on the extent to which both the support services of technological business incubators (TBIs) and exogenous local factors, facilitate the innovation activity of incubated new ventures using data on all 215 surviving Chinese incubators and their incubated firms. The study found that technical service support from an incubator was found to have had a positive influence on all levels of innovation activity across all regions. Also, incubator financial support had a positive effect on the making of more advanced innovations. In addition, the availability of venture capital had a significant impact on making lower order innovations whereas the availability of scientific knowledge resources influenced more advanced innovation activity.

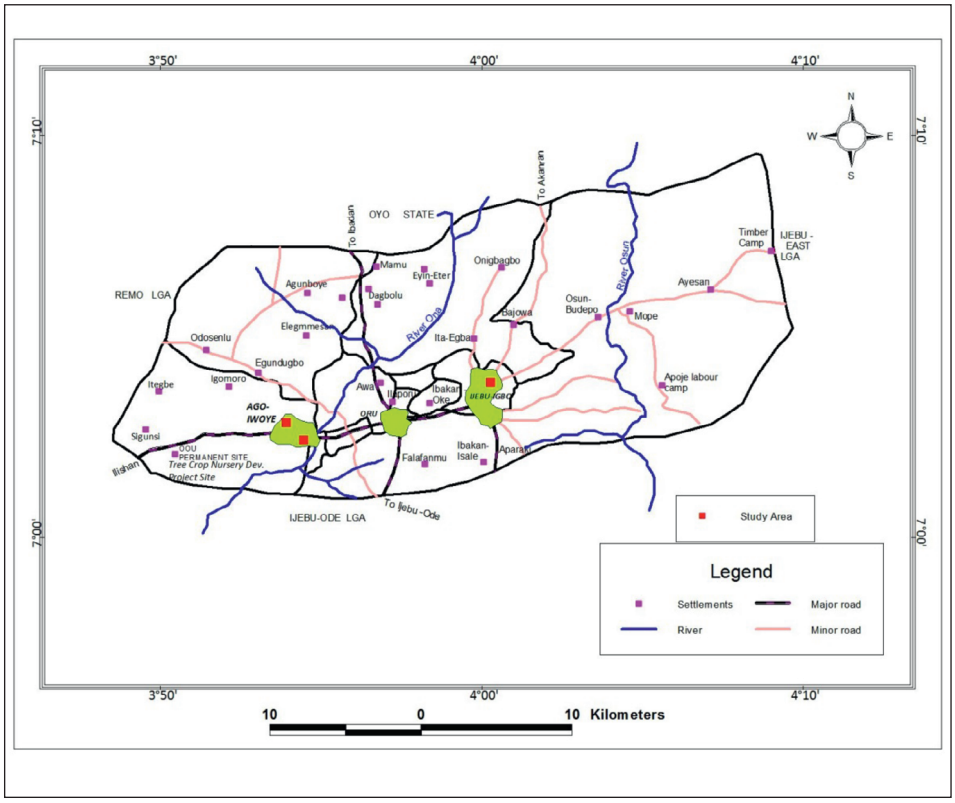
Methodology and empirical findings

The method

This study has employed a descriptive research design, ideal because it allows researchers to determine the impact of independent variables (physical and virtual incubators) on the dependent variable (early-stage start-ups). The participants in the research are members of specifically chosen early-stage start-up businesses in Ijebu-North Local Government Area of Ogun State, Nigeria. The total number of participants in the selected early-stage start-up businesses (152) cover the major towns of Oru, Ilaporu, Awa, Ago-Iwoye,

Ijebu-Igbo and Mamu. The map of Ijebu North Local Government Area shows the six towns within it.

Figure 1. Map of Ijebu North LGA, Ogun State, Nigeria showing the study area



Source: authors, 2024

The sampling technique for this study is purposive and the sample size is census sampling covering the entire population. A questionnaire was used to gather primary data; copies were self-administered and an electronic mail survey was employed where necessary through the help of research assistants. The distribution and retrieval of the questionnaire was conducted between April and June, 2024, covering a period of almost three months. A total of 170 copies (hard and electronic copies) were administered, but only 152 were found usable for this study.

To ensure that the questionnaire had validity in terms of contrast, substance, criteria and readability, and was appropriate for the study's aims, draft copies were made available to specialists and colleagues for their comments and opinions. The accuracy of the measuring tool was evaluated using the Cronbach alpha coefficient between 0 and 1 where a coefficient value that is close to 1 indicates that the instrument has a high level of reliability, whereas a value that is close to 0 indicates that it has either no reliability or a very poor level.

Table 1. Reliability statistics

Cronbach's Alpha	No of Items
0.884	15

Source: authors 2024

The model

The model for this study is stated in behavioral form as presented below:

$$PESS = \beta_0 + \beta_1 PI + \mu \quad \text{(i)}$$

$$PESS = \beta_1 + \beta_1 VI + \mu \quad \text{(ii)}$$

$$PESS = \beta_0 + \beta_1 PI + \mu\, \beta_2 PI + \mu \quad \text{(iii)}$$

Where PES = Performance of Erly – Stage Start – upd;
PI = Phisical Incubator;
VI = Virtual Incubators;
= *constant;* β_1 *and* β_2 *are the slopes of the regression equation and* μ *is the error term*

In a-priori terms, , and are expected to be positive i.e. > O (*iv*)

Empirical results

Descriptive analysis

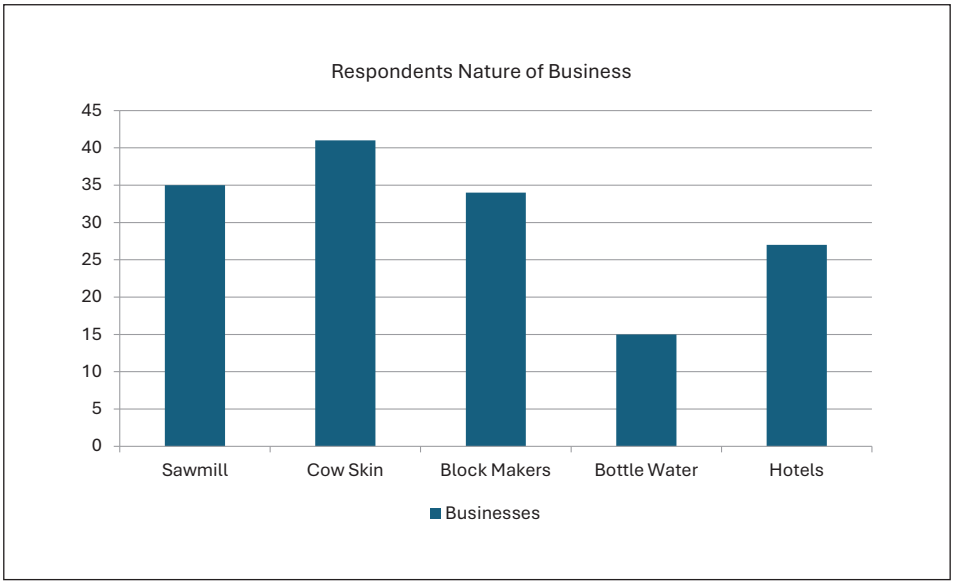
Table 2. Table of respondents according to area and nature of business

Areas/ Nature of Business	Oru	Awa	Ilaporu	Ago--Iwoye	Ijebu--Igbo	Mamu	TOTAL
Sawmill	5	3	2	6	18	1	35
Cow Skin	7	2	2	3	25	2	41
Block Makers	6	4	4	9	8	3	34
Bottled Water Firms	2	1	1	5	6	–	15
Hotels & Eateries	2	2	1	12	9	1	27
TOTAL	**22**	**12**	**10**	**35**	**66**	**7**	**152**

Source: authors, 2024

Arising from Table 2 are the purposively chosen respondents and their nature of business in the chosen areas. Sawmill and cow skin businesses, being staple in Ijebu-Igbo, accounting for 51.42 and 60.9% of the total while other towns accounted for less than 50 and 40% respectively. For block making and bottled water firms, entrepreneurs are evenly spread according to the population with Ijebu-Igbo and the university town of Ago-Iwoye

Figure 2. Respondents nature of business



Source: authors, 2024

having a larger percentage. More than 44% of the hotels and eateries in the sample area are concentrated in the university town of Ago-Iwoye because of the huge student population and beehive of activities in this area. The pictorial representation of the respondent's nature of business is presented below in a bar chart.

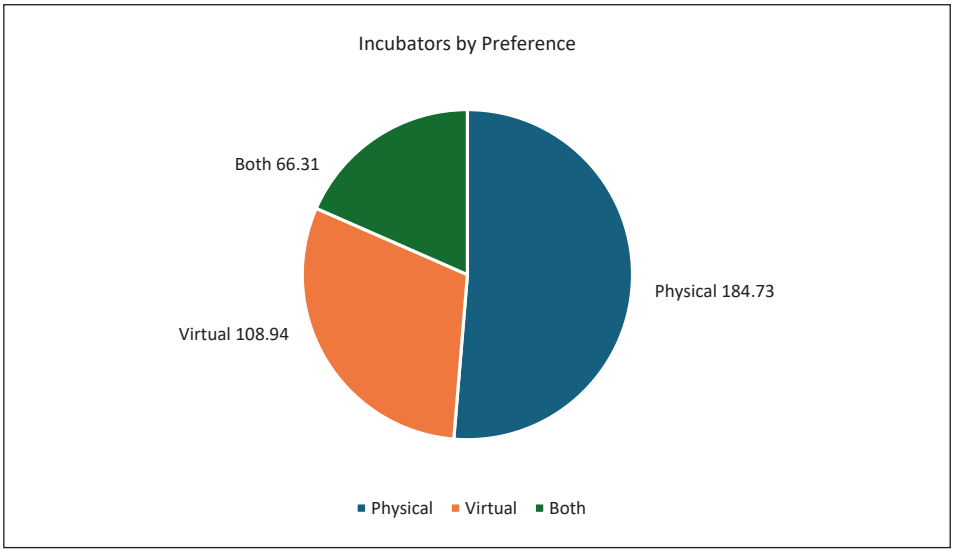
Table 3. Preferences of respondents by incubator type

Areas/ Nature of Business	Physical Incubators	Virtual Incubators	Both	TOTAL
Sawmill	19	10	6	35
Cow Skin	25	8	8	41
Block Makers	20	9	5	34
Bottled Water Firms	8	3	4	15
Hotels & Eateries	6	16	5	27
TOTAL	**78**	**46**	**28**	**152**

Source: authors, 2024

Table 3 shows the preferences of early stage start-up entrepreneurs in the sample areas and the outcomes show that almost all the respondents across businesses prefer physical incubators with the exception of hotels and eateries. This preference may not be unconnected to the huge capital investments in such businesses and prevention of undue control from outsiders. In aggregate, 51.3% prefer physical incubator facilities, 30.2% prefer virtual while 18.42% prefer both. A pictorial representation of the aggregate preferences of early stage start-up entrepreneurs in the sampled areas is shown in a pie graph below.

Figure 3. Incubators by preference of respondents



Source: authors, 2024

Testing of hypotheses

Ho1: There is no significant relationship between physical incubators and the performance of early-stage start-ups in Nigeria

Table 4: Physical incubators and early-stage start-ups in Nigeria Dependent variable: performance of early-stage start-up

Model	B	Std Error	Beta	t-stat	Sig
Constant	11.556	0.927	–	12.465	0.000
Physical Incubator	0.222	0.083	0.238	2.663	0.009
	R= 0.238	R2 = 0.057	F-statistic = 7.091 Prob = 0.009		

Source: authors, 2024

Arising from Table 4 the coefficient of the physical incubator is correctly found in line with theory and a-priori expectation. This confirms the positive relationship between physical incubator and performance of early-stage start-up in Ogun State, Nigeria. The R2 of 0.057, shows that 5.7 per cent variation in performance is explained by physical incubation. This however may be due to the influence of other factors not considered in this model such as inflation, interest and exchange rates. These macroeconomic fundamentals have a strong influence on early-stage start-up performance as well as for mature firms. The significance of the beta estimate is confirmed at both 1 and 5% with a t-value of 2.663 and a probability value of 0.009. The F-statistic of 7.091 further confirms the significance of the regression equation and other parameter estimates.

Ho2: There is no significant relationship between virtual incubators and the performance of early-stage start-ups in Nigeria

Table 5. Virtual incubators and early-stage start-ups in Nigeria Dependent variable: early-stage tart-upperformance

Model	B	Std Error	Beta	t-stat	Sig
Constant	5.043	.662	-	7.618	.000
Virtual Incubator	.348	.059	.474	5.851	.000
	R= 0.474	R2 = 0.225	F-statistic = 34.230 Prob = 0.000		

Source: authors, 2024

From Table 5, there is a significant relationship between virtual incubators and the performance of early-stage start-ups in Nigeria. With an R2 value of 0.225, it shows that there is a moderate level of interdependence between virtual incubators and the performance of early-stage start-ups. The low R2 may well be due to the non-inclusion of some macroeconomic indicators which exert a strong influence on firms. The t-statistic value of 5.851 with a probability of 0.000 is also statistically significant at both 0.01 and 0.05 levels of significance. This implies that a positive and significant relationship exists between virtual incubators and the performance of early-stage start-ups in Nigeria. Thus, the null hypothesis is rejected and alternative hypothesis is accepted. From table 3, the F-value is 34.230 with a significant value of 0.000 which is less than 0.05. The significance of the F-statistic further confirms the significance of the regression equation and all the parameter estimates.

Ho3: There is no significant combined effect of physical and virtual incubators on the performance of early-stage start-ups in Nigeria

Table 6. Virtual and physical incubators and early-stage start-ups in Nigeria

Dependent variable: early-stage start-up performance

Model	B	Std Error	Beta	t-stat	Sig
Constant	6.204	1.149	-	5.401	0.000
Physical Incubator	0.603	0.111	0.384	5.444	0.000
Virtual Incubator	0.165	0.47	0.650	3.089	0.000
	R= 0.380	R^2 = 0.145 Adjusted R^2 = 0.135	F-statistic = 14.973 Prob = 0.000		

Source: authors, 2024

From Table 6 above, it is evident that both physical and virtual incubators are in line with theory and a-priori expectations. This portends a strong and positive relationship between physical and virtual incubators and early-stage start-ups in Ogun State. Nigeria. The t-statistics and the respective probabilities of the explanatory variables confirm the

significance of the beta estimates at 1 and 5% respectively. While the adjusted R2 value of 0.135 only shows that 13.5% of the variation in the performance of early-stage start-ups in Ogun State, Nigeria can be explained by the joint influence of both physical and virtual incubators. The F-value of 14.973 and probability of 0.000 confirms the significance of all the parameter estimates in the model.

Discussion of findings

From the empirical results, the descriptive analysis revealed that from the sampled respondents, the six major towns in Ijebu-Igbo were dominated sawmill and cow skin businesses with more than 50 and 60% respectively. The Ijebu-Igbo community no doubt, has a lot of early-stage start-up entrepreneurs in sawmilling, cow slaughtering and cow skin businesses and these vocations have become their areas of comparative advantage over the years.

Other early-stage start-up entrepreneurs in the block making and bottled water businesses are fairly evenly distributed across the sampled towns. Hotels and eateries again are dominated by Ago-Iwoye entrepreneurs and most of them in their early stages. Their dominance in this area is largely due to the proximity to Olabisi Onabanjo University main and mini campuses.

The preferences of the early-stage start-up entrepreneurs across the six towns revealed that more than 50% of them favored physical incubators with the exception of those engaged in hotels and eateries. While 30.2% of the sampled respondents prefer virtual incubators, only about 18% actually embraced both physical and virtual incubators. By implication, those in hotel and eatery businesses who must have put in basic facilities and infrastructure at the inception of their business start-ups prefer virtual incubators and less control and dominance of their business. Those that actually preferred physical incubators from our sample are those in dire need of basic facilities and equipment to take them to the next level. Thus, the choice of incubators is a function of business and vocational issues.

On the testing of hypotheses, it is evident that the three hypotheses in their null form were not accepted. Instead, the alternative hypotheses were accepted based on the significance of the t-statistics at permissible levels of 1 and 5%. Regression results for Hypothesis 1 confirm the strong connection between physical incubators and the performance of early-stage start-ups in Ogun State, Nigeria. This is indicative of the fact that the physical incubator is a driver to effective performance and the survival of early-stage start-ups in Nigeria. This outcome is in agreement with the findings of Sansone et al. (2020) in Italy whose study revealed a social connection between incubators and early-stage start-ups, as well as Theodoraki et al. (2020) in France.

In a similar vein, the regression outcome on virtual incubators confirmed the existence of a significant relationship between virtual incubators and the performance of early stage start-ups in the study area. This informed the rejection of the null hypothesis and the acceptance of the alternative hypothesis, emphasizing the importance of virtual incubators through the mentoring, nurturing and provision of financial and managerial advice in developing early-stage enterprises in Nigeria. This finding agrees with that of Xiao and North (2018) in their study on the extent to which support and technical services could promote the development of early-stage firms in China.

The joint influence of both physical and virtual incubators on the performance of early--stage start-ups in Ogun State, Nigeria also affirmed the existence of a strong connection

between both variables. Thus, the alternative hypothesis of a significant relationship was upheld. The implication of this outcome is that both physical infrastructure and advisory services online as well as on the spot, nurturing and mentoring are what the incubates need to take their nascent enterprises to the next level. This finding is also supported by those of Zapata-Guerrero et al. (2021) in Mexico. These outcomes, individually and jointly could be extended to similar economies like the Polish one as well as in other developing economies.

Conclusions and policy recommendations

Conclusions

The study concluded that physical incubators are more preferred by early-stage start-up entrepreneurs and the choice of incubators (physical, virtual or both) could be determined along business and vocational lines. Physical and virtual incubators have significantly transformed the landscape for early-stage start-ups in Nigeria, playing instrumental roles in nurturing and accelerating their growth. These incubators serve as crucial ecosystems that provide a supportive environment, resources and mentorship to nascent entrepreneurs, enabling them to overcome initial challenges and thrive in the competitive business environment. The impact of physical and virtual incubators on Nigerian start-ups is profound, as evidenced by the emergence of successful ventures across various sectors. These start--ups have not only driven innovation but have also created employment opportunities, contributed to economic growth, and positioned Nigeria as a hub for entrepreneurial activity within the African continent.

The study therefore concluded that physical and virtual incubators have democratized entrepreneurship by breaking down barriers to entry, particularly for individuals from underserved communities and those with limited access to traditional funding sources. By offering inclusive programs, mentorship and resources, these incubators have empowered a diverse range of entrepreneurs to pursue their business ideas and aspirations. Looking ahead, the role of physical and virtual incubators in Nigeria's start-up ecosystem is poised to grow even further. With continued investment, strategic partnerships, and supportive government policies, these incubators can continue to serve as catalysts for innovation, job creation and economic development in Nigeria, ultimately driving sustainable growth and prosperity for the nation as a whole.

Recommendations

The following recommendations are made in the light of the findings of this study: firstly; incubator providers should concentrate more on the provision of physical incubators to promote capital formation among early-stage start-ups in Ogun State, Nigeria. Also, stakeholders, including government agencies, private investors and corporate entities should continue to invest in physical and virtual incubators to expand their reach and capacity. This investment should focus on improving infrastructure, providing access to capital, and enhancing support services for start-ups.

In addition, those providing incubators should tailor their support services to the specific needs of Nigerian start-ups, taking into account the unique challenges they face,

such as limited access to funding, infrastructural deficits and regulatory hurdles. This may involve providing targeted mentorship, training programs and access to networks both locally and internationally. Finally, the government should create an enabling environment for incubators and start-ups to thrive by implementing policies that promote entrepreneurship, innovation and investment. This may include tax incentives, regulatory reforms and initiatives to improve access to finance and infrastructure.

Limitation of the study and areas for further research

Despite the robust contributions of physical and virtual incubators on early-stage start-ups in Nigeria, as outlined by this study, the non-inclusion of the influence of other factors not considered in this model such as inflation, interest and exchange rates is a major limitation. These macroeconomic fundamentals have a strong influence on early-stage start-up performance as well as in mature firms. In addition, our inability to factor in the role of a mediating variable between incubation components and early-stage start-ups also poses another limitation.

Researchers in the Polish economy and other European nations could leverage on these shortcomings to advance similar studies in their peculiar environments. Others interested in conducting similar studies on this topic in other territories, particularly in developing economies, could also leverage on it. These limitations notwithstanding, the outcomes are not only relevant to start-ups and upcoming nano- and micro-enterprises but would also serve as reference material to government agencies and parastatals, and policy makers, as well as opinion formers in developing and developed countries.

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