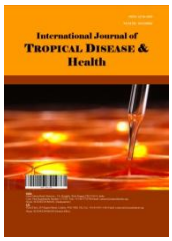

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Entrepreneurial Potentials of COVID-19 Vaccination

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The study investigated the entrepreneurial potentials of COVID-19 vaccination. The objective of the study is to identify entrepreneurial potentials in COVID-19 vaccination, to determine the business viability of COVID-19 vaccine production and to identify how an entrepreneur can contribute to covid-19 vaccination. A descriptive survey research design was adopted for the study. The sample of the study was achieved using random sampling technique. The sample for this study was 69 respondents. These respondents were selected sixty nine (69) employees of health Centres and hospitals dispensing COVID-19 vaccines in Nigeria. The instrument used to collect data was the questionnaire. The data collected were analyzed using simple percentage, mean, standard and chi square. The overall finding of the study are that there is entrepreneurial potential in covid-19 vaccination, sales of vaccine, production of vaccine and distribution of vaccine are the entrepreneurial potentials in COVID-19 vaccination; the study also revealed that there is significant and positive relationship between Covid-19 vaccine production and profitability and It was also discovered that entrepreneurial innovation made Covid-19 vaccines possible and a viable business model. High demand of COVID-19 vaccine, global acceptance of the COVID-19 vaccine, effectiveness of the vaccine has made COVID-19 vaccine production a viable business. Base on the findings of the study, the following recommendations were made among others that government officials should support a more productive interaction and collaboration between them and pharmaceutical firms with a focus on capacity building for entrepreneurship development.

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Keywords: Entrepreneurial potential; COVID-19; profitability; entrepreneurial innovation; vaccination; vaccine production; business viability.

1. INTRODUCTION

The entrepreneurial potential refers to the perceived desirability, perceived feasibility, perceived self-efficacy and propensity to act that influence the intention to create a business (Carvalho 2016). It's also known as a series of behavioral, social and environmental characteristics from an individual's own nature as entrepreneurs [1,2,3,4].

Schmidt and Bohnenberger [5] assert that entrepreneurial potential involves identifies opportunities, plans, takes calculated risks, socio-present, innovative or persistent. The entrepreneurial capacity essentially links a range of psychological, behavioral and social characters commonly seen in successful entrepreneurs, who are considered to be convergent in explanatory terms [6].

Khanna [7] states that the potentials for entrepreneurship could start from the small players and new entrants to the market. Thus, there is no doubt that some of the undergraduates with expressions of talents would become entrepreneurs. It is also noteworthy that there is a market value for some of the talents identified among the respondents. An observation of the activities in the Nollywood industry in Nigeria shows the economic importance of good music, drama and dancing skills. A similar observation was made in Beckman's [8] study of entrepreneurial education among students in American universities, where 92% of the students who participated in entrepreneurial courses were satisfied with their entrepreneurial career.

Koelinger [9] observes that high educational attainment, unemployment, and a high degree of self-confidence are significantly associated with entrepreneurial potential at the individual level'. Akeem, [10] cite Heunks' [11] who in his survey of 200 managers of small firms in six European countries showed that risk taking, education, and self-confidence significantly correlated with entrepreneurial potential, which tends to depend on some factors such as, level of education, self-confidence, future orientation, and desire for leadership. And, Herson [12] noted that some forms of higher education will be an important career facilitator for people with entrepreneurial skills. Moreover, Audretsch [13] noted that universities are important sources of knowledge and ideas for economically successful enterprises.

Obschonka, Silbereisen, & Schmitt-Rodermund, [14] asserted that entrepreneurial potential is warranted, as there are at least two more areas that need exploration. Firstly, the complete and undoubted set of entrepreneurial potential elements has not been elaborated so far. Bearing in mind various approaches to entrepreneurship, constructing unequivocal and indisputable notion of entrepreneurial potential seems to be a complicated task. Secondly, the determinants of entrepreneurial potential remain generally unidentified [15]. As the results of research are contradictory, little is known about to what extent entrepreneurial potential can be associated with cultural factors, economic development, social attitudes, historical and political issues, etc. Unquestionably, this part of entrepreneurship theory offers significant challenges and will be thoroughly explored in the years to come [16].

WHO [17] posits that COVID-19 vaccine is a vaccine intended to provide acquired immunity against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus causing coronavirus disease 2019 (COVID-19). Prior to the COVID-19 pandemic, there was an established body of knowledge about the structure and function of coronavirus causing diseases like severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), which enabled accelerated development of various vaccine technologies during early 2020 [18]. On 10 January 2020, the SARS-CoV-2 genetic sequence data was shared through GISAID, and by 19 March, the global pharmaceutical industry announced a major commitment to address COVID-19 [17].

WHO [17] in Phase III trials, several COVID-19 vaccines have demonstrated efficacy as high as 95% in preventing symptomatic COVID-19 infections. As of March 2021, 12 vaccines were authorized by at least one national regulatory authority for public use: two RNA vaccines (the Pfizer–BioNTech vaccine and the Moderna vaccine), four conventional inactivated vaccines (BBIBP-CorV, CoronaVac, Covaxin, and CoviVac), and four viral vector vaccines (Sputnik V, the Oxford–AstraZeneca vaccine, Convidecia,

and the Johnson & Johnson vaccine), [18]. In total, as of March 2021, 308 vaccine candidates were in various stages of development, with 73 in clinical research, including 24 in Phase I trials, 33 in Phase I–II trials, and 16 in Phase III development (London School of Hygiene and Tropical Medicine, 2021).

Many countries have implemented phased distribution plans that prioritize those at highest risk of complications, such as the elderly, and those at high risk of exposure and transmission, such as healthcare workers (Beaumont, 2020). As of 27 March 2021, 541.05 million doses of COVID-19 vaccine have been administered worldwide based on official reports from national health agencies. AstraZeneca-Oxford anticipates producing 3 billion doses in 2021, Pfizer-BioNTech 1.3 billion doses, and Sputnik V, Sinopharm, Sinovac, and Johnson & Johnson 1 billion doses each. Moderna targets producing 600 million doses and Convidecia 500 million doses in 2021 (Pharmaceutical Processing World, 2021). By December 2020, more than 10 billion vaccine doses had been preordered by countries, Mullard, 2020) with about half of the doses purchased by high-income countries comprising 14% of the world's population (*So and Woo, 2020).*

According to NCDC, (2021) on 2 March 2021 at Abuja, Nigeria received nearly 4 million doses of the COVID-19 vaccine, shipped via the COVAX Facility, a partnership between CEPI, Gavi, UNICEF and WHO. The arrival marked a historic step towards the goal to ensure equitable distribution of COVID-19 vaccines globally, in what will be the largest vaccine procurement and supply operation in history (WHO, 2021). The delivery is part of a first wave of arrivals in Nigeria that will continue in the coming days and weeks. COVAX shipped 3.94 million doses of the AstraZeneca/Oxford vaccine, manufactured by the Serum Institute of India (SII), from Mumbai to Abuja (UNICEF, 2021)

1.1 Objectives of the Study

This main objective of the study is to assess entrepreneurial potentials of covid-19 vaccination. Specifically the study intend to;

i. To identify entrepreneurial potentials in COVID-19 vaccination.
ii. To determine the business viability of Covid-19 vaccine production.
iii. To identify how an entrepreneur can contribute to covid-19 vaccination

1.2 Research Question

The following research questions were raised in line with the objectives of the study;

i. What is the entrepreneurial potential of covid-19 vaccination?
ii. What is the business viability of Covid-19 production?
iii. How can an entrepreneur contribute to covid-19 vaccination?

1.3 Research Hypothesis

The following are the alternate hypotheses of the study**:**

i. There is entrepreneurial potential in Covid-19 vaccination
ii. There is significant relationship between Covid-19 vaccine production and profitability
iii. Entrepreneurial innovation made Covid-19 vaccines possible.

2. REVIEW OF LITERATURE

2.1 Conceptual Framework of Entrepreneurial Potential

Despite the fact that the concept of entrepreneurial potential is well-established in the literature, there is still a need for a more detailed definition. There are even differences in terminology, Rosemary [19] use the term "enterprise potential," in reference to entrepreneurial potential mentioned by other authors.

Entrepreneurial potential according to Krzysztof, [20] refers to individuals who will ultimately become entrepreneurs. Problems with defining entrepreneurial potential start just at this point, as the notion of entrepreneur is not defined yet, in spite of extensive works. One of the most important difficulties encountered when trying to define entrepreneurial potential is the fact that definitions are generally created using ex post facto approach (Beaumont, 2020 cite [21]). Entrepreneur, for example, is defined as a person who has done something. Such functional definitions are crucial for telling the difference between entrepreneurs and non-entrepreneurs. Entrepreneurial potential cannot be defined in

this way, as it is related to potential entrepreneurs; people, who may become entrepreneurs in the future. That requires ex ante approach and makes entrepreneurial potential difficult to define. This definition must be based on capability of performing the required function. Therefore, it could be stated that entrepreneurial potential is a set of attitudes, motives and knowledge that enables entrepreneurial activity. Such a tentative general definition allows showing the place of entrepreneurial potential in the whole process of becoming an entrepreneur [40].

A good starting point for showing the significance of entrepreneurial potential is a model elaborated on the basis of the Theory of Planned Behaviour (TPB) and Shapero's Model of the Entrepreneurial Event (SEE) [22]. TPB is based on three groups of beliefs that are "filtered" by subjective norms, attitudes and perceptions and, consequently, they create intention, which in turn results in a given behaviour [23]. Behavioural beliefs are combined with attitude towards the expected outcomes from the behaviour. Normative beliefs are influenced by subjective norms accepted by the social environment of the person intending to behave in the given way. The last groups of beliefs are control beliefs which shape the intention to behave in the specified way through the lens of perception: am I able to perform the task? The third element of the model can be identified with self-efficacy and perceived self-efficacy. The efficacy (personal ability to execute target behaviour) is indispensable for executing behavior.

The entrepreneurial potential, essentially, links a series of psychological, behavioural and social characteristics commonly found in successful entrepreneurs, considered convergent in explanation of a representative construct for a possible behaviour: to become entrepreneur [22, 24]. Following this prerogative, Santos [25] proposed that the potential entrepreneur is a construct subsidized by three dimensions of attributes from the successful entrepreneur - Achievement, Planning and Power - and a complementary dimension related to desirable - Entrepreneurial Intention. While the attributive dimensions refer to the entrepreneurial characteristics [26], the Entrepreneurial Intention is a criterion of inhibition or activation to the entrepreneurship in favourable conditions, for example, easy access to capital and, therefore, it is considered complementary to the entrepreneurial potential.

Within each dimension there are factors that are established as entrepreneurial attributes. In the dimension of Achievement, there are the following attributes: Opportunities Recognition, Persistence and Efficiency. In the dimension of Planning, there are the following attributes: Goal Setting, Information Search, Continuous Planning, and Permanent Control. In the dimension of Power, there are the following attributes: Capacity to Persuade and Capacity to Build Network of Relationships. Moreover, in the dimension of Entrepreneurial Intention, there is the desire to start a business [25]. According to that Santos' [25] model, the entrepreneurial potential must demonstrate specific characteristics in each of the attributes (Table 1).

It believes among scholar that entrepreneurial potential is a construct that encompasses individual, psychosocial and behavioural aspects making up an entrepreneur [27, 28, 25], (Alves & Bornia, 2011). Obviously, it is possible for an individual to possess entrepreneurial attributes and do not start a business. This occurs due to the orientation that separates inventors and innovators from those who become entrepreneurs: the firsts are oriented by the "materialization of the idea", while the latter are oriented by the "commercialization/marketing". So, characteristics commonly found in successful entrepreneurs are attributed to the potential entrepreneurs [25, 29].

Among the most often investigated elements of entrepreneurial potential are locus of control and innovativeness [36]. Entrepreneurial self-efficacy, level of economic development of a country and many others [24] It can be clearly visible from the above mentioned papers that we still lack a uniform framework for measuring entrepreneurial potential and research findings are often contradictory. Samples that are used for investigating entrepreneurial potential usually consist of students (most often – business students). This can be perceived as yet another flaw, as not all students should be treated as good proxies for entrepreneurs [36]. A promising exemption is the recent paper by Athayde [24], who focused on secondary schools' pupils, taking part in Young Enterprise Company Program. However, this paper does not fill the existing gap; there is still a lack of studies based on samples of "ordinary people". Young age (which applies both to pupils and students) does not have to be a part of a potential entrepreneur's characteristics.

2.1.1 COVID-19 vaccinations

According to WHO, (2020) vaccination is a simple, safe, and effective way of protecting people against harmful diseases, before they come into contact with them. It uses your body's natural defenses to build resistance to specific infections and makes your immune system stronger. Vaccines are a way of artificially activating the immune system to protect against infectious disease. The activation occurs through priming the immune system with an immunogen. Stimulating immune responses with an infectious agent is known as immunization. Vaccination includes various ways of administering immunogens [18]

Most vaccines are administered before a patient has contracted a disease to help increase future protection. However, some vaccines are administered after the patient already has contracted a disease. Vaccines given after exposure to smallpox are reported to offer some protection from disease or may reduce the severity of disease [18]. According to the report, Covid 19 vaccines are critical new tools in the battle against COVID-19;

Table 1. Santos [25] Entrepreneurial Potential Characteristics for Each Attribute

Attribute	Characteristics
Opportunity	Individual must show that he/she has sense of opportunity, i.e., is aware of what happens around him/her and then, when to identify the needs of people or market, be able to take advantage of unusual situations to start new activities or business.
Persistence	Individual's capacity to remain steadfast in the pursuit of success, demonstrating persistence to achieve its objectives and goals, overcoming obstacles along the way. Capacity to distinguish persistence from stubbornness, admit mistakes and know how to redefine goals and strategies.
Efficiency	Individual's capacity to do things on the right way and, if necessary, quickly make changes to adapt itself to changes occurred in the environment. Capacity to find and achieve to operationalize ways of doing things better, faster and cheaper. Capacity to develop or use procedures to ensure that the work is completed on time.
Goals	Individual's capacity to show determination, sense of direction and set objectives and goals, defining clearly where he/she plans to arrive. Capacity to set directions and measurable objectives.
Information	Individual's availability to learn and demonstrate the thirst for knowledge. Interest in finding new information in his area or beyond. Attention with all the internal and external factors related to his organization/company/ business. Interest in how manufacture products or provide services. Availability to seek expert help on technical or commercial matters.
Planning	Individual's availability to plan his activities by setting objectives. Capacity to detail the tasks and being able to work with planning, execution, and control.
Control	Individual's capacity to monitor the implementation of the elaborated plans, keep records and use them in the decision making process, check the reach of the results obtained.
Persuasion	Individual's ability to influence people for the execution of tasks or actions that enable the achievement of his/her goal. Capacity to convince and motivate people, lead teams and encourage them using the words and actions appropriated to influence and persuade.
Network	Individual's capacity to establish a good network of relationships with acquaintances, friends and people who may be helpful to him/her, making possible the achievement of his/her objectives.
Entrepreneurial Intention	Foreshadows the individual's intention to have, either by acquiring or from scratch, his/her own business.

Source: Santos [25]

A COVID-19 vaccine is a vaccine intended to provide acquired immunity against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus causing coronavirus disease 2019 (COVID-19). On 10 January 2020, the SARS-CoV-2 genetic sequence data was shared through GISAID, and by 19 March, the global pharmaceutical industry announced a major commitment to address COVID-19 (Padilla, 2021).

According to Mayor Clinic (2021) there main types of COVID-19 vaccines currently available include:

i. **Messenger RNA (mRNA) vaccine.** This type of vaccine uses genetically engineered mRNA to give your cells instructions for how to make a harmless piece of the S protein found on the surface of the COVID-19 virus. After vaccination, your immune cells begin making the S protein pieces and displaying them on cell surfaces. This causes your body to create antibodies. If you become infected with the COVID-19 virus, these antibodies will fight the virus. After the mRNA helps your cells make the protein pieces, the mRNA is immediately broken down. It never enters the nucleus of your cells, where your DNA is kept. Both the Pfizer-BioNTech and the Moderna COVID-19 vaccines use mRNA.

ii. **Vector vaccine.** In this type of vaccine, genetic material from the COVID-19 virus is inserted into a different kind of weakened live virus, such as an adenovirus. The weakened virus (viral vector) serves as a delivery system. When the viral vector gets into your cells, it delivers genetic material from the COVID-19 virus that gives your cells instructions to make copies of the S protein. Once your cells display the S proteins on their surfaces, your immune system responds by creating antibodies and defensive white blood cells. If you become infected with the COVID-19 virus, the antibodies will fight the virus. Viral vector vaccines can't cause you to become infected with the COVID-19 virus or the viral vector virus. Also, the genetic material that's delivered doesn't become part of your DNA. The Janssen/Johnson & Johnson COVID-19 vaccine is a vector vaccine. AstraZeneca and the University of Oxford are also working on a vector COVID-19 vaccine.

iii. **Protein subunit vaccine.** Subunit vaccines include only the parts of a virus that best stimulate your immune system. This type of COVID-19 vaccine contains harmless S proteins. Once your immune system recognizes the S proteins, it creates antibodies and defensive white blood cells. If you become infected with the COVID-19 virus, the antibodies will fight the virus.

2.1.2 Profitability of Covid-19 vaccination, production and distribution

Several manufacturers have successfully developed COVID-19 vaccines in less than 12 months—an extraordinary achievement, given it typically takes a decade or longer to develop new vaccines.

The world now needs more doses of COVID-19 vaccines than it has done for any other vaccine in history to inoculate enough people for global vaccine immunity. Vaccines often suffer from underinvestment, but that has not been the case in this pandemic. As of Feb 3, 2021, there were 289 experimental COVID-19 vaccines in development, 66 of which were in different phases of clinical testing, including 20 in phase.
Only five of these 66 vaccines—those developed by AstraZeneca in partnership with Oxford University, BioNTech in partnership with Pfizer, Gamaleya, Moderna, and Sinopharm in partnership with the Beijing Institute—have been authorised by stringent regulatory authorities (as per WHO criteria of such authorities2) or WHO. Another five—from China, India, Kazakhstan, and Russia—have received approval or been authorised for emergency use by other regulatory agencies; some of the organisations developing these vaccines have submitted documentation to WHO for emergency use listing or prequalification, but these submissions are still under review.

Additional vaccines from Novavax and Johnson & Johnson are expected to be authorised on the basis of positive interim phase 3 results. Several vaccines have shown high levels of efficacy (ie, more than 70%) in clinical trials, although not all developers have published their results; most of the authorized vaccines have been shown to provide strong protection against hospitalizations and deaths due to COVID-19. Whereas public support for basic research and early-stage drug development is widespread and in urgent need to develop COVID-19 vaccines and scale up supply

has inspired new ways of aiding research, development, and production activities and enlisting broad participation among private companies.

Governments and non-profit organizations have financed clinical trials, invested in the building and expansion of production facilities, and established contract manufacturing and distribution networks to enable the rapid roll-out of successful vaccines.

2.2 Theoretical Framework

2.2.1 Human capital entrepreneurship theory

Human capital entrepreneurship theory was postulated by Becker [30] and derives its premise primarily on two factors which are; education and experience. The theory postulates that knowledge acquired from education and experience, is considered a resource that is diversely dispensed across individuals, which informs the basis for understanding the disparities in identification and exploitation of opportunities [31]. Davidson and Honig [32] and Anderson and Miller [33], affirmed that human capital factors as has a positive impact on the emergence of nascent entrepreneurs. This implies that Human capital theory of entrepreneurship creates a foundation for the place of education regarding entrepreneurial development which makes it particularly relevant to the context of entrepreneurship education [35]. Specifically, in the context of this study Shane and Vankataraman (2000) argued that human capital factors are salient to idea generation, opportunity recognition and business planning. This according to Anderson and Miller [33] implies that the components of an entrepreneurship programme have a prominent role to play in enhancing the development of abilities associated with successful entrepreneurial outcomes of an entrepreneurship programme.

2.2.2 Theory of planned behaviour

The study adopt Ajzen's [23] theory of planned behaviour (TPB), dealing with intentions for an understanding of behaviour. Ajzen [23] considered culture and social conditions as key determinants of human behaviour. Volkema and Bergmann (1995, 6) noted that 'intentions alone are sufficient to predict actions when an individual has control over behavioural performance'. The TPB provides a model that guides human action and predicts the occurrence of a specific intentional behaviour. The model comprises three variables such as attitudes, subjective norms and perceived behavioral control. These variables produce the modalities for a change in behaviour. The scope of a particular behavior includes target, action, context and time (TACT). Francis et al. [34: 7] summarized the TPB thus:

> To predict whether a person intends to do something, we need to know … Whether the person is in favour of doing it ('attitude') … How much the person feels social pressure to do it ('subjective norm') … Whether the person feels in control of the action in question ('perceived behavioural control'). By changing these three 'predictors', we can increase the chance that the person will intend to do a desired action and thus increase the chance of the person actually doing it.

Although the relationship between behavioural intention and actual behaviour may not be perfect, intention can be used as a proximal measure of behaviour. An attitude toward behaviour is a person's overall evaluation of the behaviour. The attitude has two components: beliefs about consequences of the behaviour and the corresponding judgement about the consequences of the behaviour. Subjective norms are a person's own estimate of the social pressure to perform or not perform the target behaviour. Subjective norms have two components: beliefs about how other people would like them to behave. The perceived behavioural control of the behaviour is the degree of a person's ability to enact the behaviour. It has two aspects: how much a person has control over the behaviour and how confident a person feels about ability to perform the behaviour. It is determined by control beliefs about the power of both situational and internal factors to inhibit or facilitate the performing of the behaviour [34].

2.3 Empirical Study

Gustavo et al. [35] in their study which aimed to verify whether there is a difference of entrepreneurial potential between successful entrepreneurs and entrepreneurs who have failed; and whether there are variables that may work as a means of prediction to the success or failure of an entrepreneur. It brings up an innovative approach to the entrepreneurship

researches, which main content is in the empirical operationalization of success and failure on business for the testing of specific hypothesis and the identification of the antecedents and consequences of entrepreneurial potential. The research was conducted on a descriptive and quantitative approach. We applied the scale of entrepreneurial potential in 246 entrepreneurs, which 100 correspond to the analysis criteria, operationally, as successful entrepreneurs (n = 50) and entrepreneurs who failed (n = 50). Data were analysed by statistics techniques of logistic regression and Student's t test. Results show that the successful entrepreneur has higher scores in entrepreneur potential scale than the entrepreneur who failed, in which the main convergence between entrepreneurial potential and business success is the setting business goals. In the investigated sample, the gender showed being a strong predictor of business success, indicating that men have 2.8 times greater chance of success in business than women.

Akeem [10] in his study examines the development of entrepreneurial potential among the undergraduates of a private university in north-central Nigeria. A total of 250 randomly selected undergraduates from various departments participated in a survey at the university. The findings revealed that the overwhelming proportions of the respondents expressed their talents with an interest in entrepreneurship. Self-employment in the informal economy was the next plan of more than half of the respondents. Several factors such as ethnicity, level of education, self-expression, and interest in entrepreneurship influenced the expression of talents and desire for entrepreneurship. It is concluded that investment in higher education with interest in entrepreneurship will enhance the development of entrepreneurial potential among graduates in Nigeria. This suggests the need for relevant strategies including self-help, innovative behavior, and government-university-industry interaction for the development of entrepreneurship in Nigeria.

Inacio Jr. et al (2004) study which measure the extent to which pharmacists have entrepreneurial potential. The study is a case study where only pharmacists in Jönköping are investigated. The case study is done as a quantitative research where we measured entrepreneurial potential by a self-completion questionnaire. The sample consisted of 64 pharmacists, from which we received response from 33 of them. The questionnaire is designed as the semantics scale with a range of 1 to 6, where the higher number equals a stronger entrepreneurial orientation. The study found that the pharmacists did have an entrepreneurial orientation, i.e. entrepreneurial potential. The whole population had a score slightly above the 'neutral average' showing a leaning towards being entrepreneurially oriented. In fact 42.4 percent of pharmacists were to be defined to have clear entrepreneurial potential according to our measurements.

In their study of the most important factors in fostering growth in Appalachian and other geographical regions with historically low growth rates in the United States, Stephens et al. [36] considered various factors such as self-employment, human capital, creativity, university spillovers and high-technology clusters. Their results show that entrepreneurial potential are important for increasing growth in low growth regions. Geldhof et al. [37] examined the joint role of personal attributes, contextual attributes, and characteristics of person-context relationships in predicting entrepreneurial intent in a survey of 3 461 students enrolled in colleges and universities in the United States. Their findings showed that self-regulation, innovation orientation, and possession of entrepreneurial role models could predict students' intentions to pursue an entrepreneurial career.

In contrast to the cases of the development of entrepreneurial potential in several countries, Chinese students exhibited inadequate interest in entrepreneurship despite their excellent performances in reading, mathematics and sciences, as shown in the results of the Programme for International Students Assessment (PISA), ranking China first among the 65 nations that participated in the study [38]. The PISA scores are often perceived as the measure of a nation's education quality and its students' academic abilities. Available records showed that Chinese students' PISA scores in reading, mathematics, and sciences negatively correlated with entrepreneurship indicators [38]. This situation suggests the need for a restructuring of the Chinese educational system to promote students' interest in entrepreneurship. Like the Chinese experience, there is recognition of innovation and entrepreneurship as two critical ingredients in the continuous economic growth of Singapore [39]. Further review of the literature

showed the description of Singapore as 'an education giant that has trouble producing the creative and entrepreneurial talents it needs' [38].

3. METHODOLOGY

3.1 Design of the Study

The study adopted descriptive design which aimed at carry out to assess entrepreneurial potentials of covid-19 vaccination. Descriptive design includes using the opinion, views, position and decision to make a general statement or decisions about the researcher's interest proof. In a study of this nature, descriptive survey design was very appropriate.

3.2 Population of the Study

The population of the study consists of all employees of health Centres and hospitals dispensing Covid-19 vaccines in Delta state. There are about 83 employees of health Centres and hospitals dispensing Covid-19 vaccines in Delta state.

3.3 Validity of the Instrument

The instrument were validated through a review by a panel of experts consisting of nursing professionals as well as experienced professional researchers to ascertain face and content validity, they were requested to criticize the items in terms adequacy in content to meet the objectives of the study, based on their corrections and suggestion and with the approval of the supervisor the final copy was produced.

3.4 Reliability of the Instrument

In an attempt to measure reliability of the instrument, the questionnaire was subjected to a pilot test by distributing 10 copies of the instrument to 83 pharmaceutical firms at Agbor based on convenience method. To ascertain the internal consistency of the instrument Cronbach Alpha method was used yielding a reliability coefficient of 0.82 hence the instrument was adjudged reliable for the study.

3.5 Method of Data Analysis

Data collected was tallied according questionnaire items under research questions and analysed using computer software package programme statistical package for social sciences (SPSS version 20). The bio-data of the respondents was analyzed using frequency distribution and percentages. While the research question were analyzed with mean and standard deviation.

4. PRESENTAION OF DATA AND DISCUSSION OF FINDINGS

Sixty-nine copies of questionnaires were distributed to the Sixty-nine medical professionals in the health Centres and hospitals dispensing Covid-19 vaccines in Asaba, Delta State. However, only Sixty-eight copies were successfully retrieved. This therefore represents a success rate of 98.55%, represent the sample size.

4.1 Demographic Data of Respondents

Table 2 reveals that 42 respondents, representing 61.8%% were male, while 26 representing 38.2% were female. This implies that there are more male than female in the research.

Table 2. Gender distribution of respondents

Sex	No. of respondents	Percentage (%)
Male	42	61.8%
Female	26	38.2%
Total	**68**	**100**

Source Field Survey 2021

Table 3. Age distribution of respondents

Age	No. of respondents	Percentage (%)
19-28yrs	3	4.4%
29-39yrs	35	51.5%
40yrs and above	30	44.1%
Total	**68**	**100**

Source Field Survey 2021

From Table 3, 35(51.5%) of respondents fall between the age of 29-39years representing a simple majority of the respondents, while 30(44.1%) are between 40yrs and above years; and those between 19-28years formed 4.4%, while none of the respondents fall between 18years and below.

From the Table 4, 36(52.9%) respondents are HND/ BSc/MBBS holder forming a simple

majority of the respondents; 30 respondent representing 44.1% are MA/MSc holders; while 2 respondent representing 2.9% are PhD holders. However, none of respondents are FSLC, SSCE and ND/NCE holders.

Table 4. Educational qualification distribution of respondents

Educational qualification	No. of respondents	Percentage (%)
HND/ BSc/MBBS	30	44.1%
MA/MSc	36	52.9%
PhD	2	2.9%
Total	**68**	**100**

Source Field Survey 2021

4.2 Analysis of Research Question

Research Question One: What are the entrepreneurial potentials in COVID-19 vaccination?

Table 5 revealed that respondents agreed with item 1, 2 and 3 with mean score of 3.1, 3.3 and 3.1 respectively, the means scores were significantly higher than 2.5, the benchmark for rating a mean score as agreed. On the other hand, respondents disagreed with item 4 with means score of 2.0 less than benchmark of 2.5. The results imply sells of vaccine, production of vaccine and distribution of vaccine are the entrepreneurial potentials in COVID-19 vaccination.

Research Question Two: What is the business viability of Covid-19 production?

Table 6 revealed that respondents agreed with all item with mean score of between 2.9 and 3.6 respectively, the means scores were significantly higher than 2.5, the benchmark for rating a mean score as agreed. The results imply high demand of Covid-19 vaccine, global acceptance of the covid-19 vaccine, effectiveness of the vaccine and the demand for the vaccines will lead to increased market share will make the business viability of Covid-19 production.

Research Question Three: What are the profitability of Covid-19 vaccination production and distribution**?**

Table 7 revealed that respondents agreed with item 1 and 2 with mean score of 2.9 and 3.4 respectively, the means scores were significantly higher than 2.5, the benchmark for rating a mean score as agreed. On the other hand, respondents disagreed with item 3 and 4 with means score of 1.6 and 2.1 less than benchmark of 2.5. The results imy are the profitability of Covid-19 vaccination production and distribution.

4.3 Test of Hypotheses

The hypothesis formulated in chapter one will be tested in line with the objectives of the study. Three hypotheses were formulated to guide the study. There is need to restate the hypotheses to be tested:

Table 5. To identify the Entrepreneurial potentials in COVID-19 vaccination

S/N	Statement	SA	A	D	SD	MEAN	Remark
1.	Sales of Covid-19 vaccines are the entrepreneurial potential of covid-19 vaccination	24 35.29(%)	28 41.18(%)	12 17.65(%)	4 5.88(%)	3.1	Agreed
2.	Production of vaccine is the entrepreneurial potential of Covid -19 vaccination.	40 58.82(%)	16 23.53 (%)	2 2.94 (%)	10 14.71 (%)	3.3	Agreed
3.	Distribution of vaccine is the entrepreneurial potential of Covid-19	30 44.12(%)	26 38.24 (%)	3 4.41 (%)	9 13.24 (%)	3.1	Agreed
4.	Marketing of vaccine is the entrepreneurial potential of Covid-19	9 13.24(%)	10 14.71(%)	23 33.82(%)	26 38.24(%)	2.0	Disagreed

Source: Field Survey 2021

Table 6. To determine the business viability of Covid-19 vaccine production

S/N	Statement	SA	A	D	SD	MEAN	Remark
1.	High demand of Covid-19 vaccine has led to increase in profit	42 61.76(%)	20 29.41(%)	6 8.82(%)	- -	3.5	Agreed
2.	Global acceptance of the Covid-19 vaccine will lead to the survival of the business	19 27.94(%)	42 61.76(%)	5 7.35(%)	2 2.94(%)	3.1	Agreed
3.	Effectiveness of the vaccine will increase the demand	40 58.82(%)	28 41.18(%)	- -	- -	3.6	Agreed
4.	The demand for the vaccines will lead to increased market share	32 47.06(%)	22 32.35(%)	6 8.82(%)	8 11.76(%)	2.9	Agreed

Source: Field Survey 2021

Table 7. Profitability of Covid-19 vaccination production and distribution

S/N	Statement	SA	A	D	SD	Mean	Remark
1.	Sales of the vaccines will lead to profitability	27 39.71(%)	22 32.35(%)	3 4.41(%)	16 23.53(%)	2.9	Agreed
2.	The global demand of the vaccines will will help the business to survive	40 58.82(%)	22 32.35(%)	1 1.47(%)	5 7.35(%)	3.4	Agreed
3.	The effectiveness of the vaccines will lead to profit	2 2.94(%)	4 5.88(%)	24 35.29(%)	38 55.88(%)	1.6	Disagreed
4.	The Covid-19 vaccine production and distribution will lead to profit	12 17.65(%)	1 1.47(%)	34 50.00(%)	21 30.88(%)	2.1	Disagreed

Source: Field Survey 2021

Hypothesis One

H1: There is entrepreneurial potential in Covid-19 vaccination.

Hypothesis Two

H1: There is significant and positive relationship between Covid-19 vaccine production and profitability.

Hypothesis Three

H1 Entrepreneurial innovation made Covid-19 vaccines possible.

4.3.1 Test of hypothesis one

There is entrepreneurial potential in Covid-19 vaccination. The hypothesis will be tested using non-parametric chi-square analysis.

4.3.1.1 Decision rule

We compare the calculated chi-square value (x^2) to tabulated X^2 value at 5% level. If the X^2 obtained is greater than the tabulated (critical) X^2, then reject H0 which is the null hypothesis and accept H1 which is the alternative hypothesis. But if the chi-square obtained is less than the critical X^2 value, we accept the null hypothesis and reject the alternative hypothesis.

Using the chi-square result performed on the responses to the question of whether entrepreneurship potential in Covid-19 vaccination is effective or not we compute X2 value as presented in tables below showing the observed and expected.

Table 8. Entrepreneurial potential

	Observed N	Expected N	Residual
strongly disagree	49	100.0	-51.0
Disagree	59	100.0	-41.0
Agree	92	100.0	-8.0
strongly agree	200	100.0	100.0
Total	400		

Table 9. Test statistics

	Selling of vaccine
Chi-Square	143.460[a]
Df	3
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 100.0.

From the result, df =3, chi-Square calculated is 143.46. the critical X^2 at 5% level of significant =14.860 .

Using the decision rule, since the tabulated x^2 =14.860 at 0.05 is lesser than the calculated value of 143.46 **therefore**; we reject the Null hypothesis H0 and accept the alternative hypothesis H1 which states that there is entrepreneurial potential in Covid-19 vaccination and the relationship is effective and viable.

4.3.3 Test of hypothesis two

Hypothesis Two

H1: There is significant and positive relationship between Covid-19 vaccine production and profitability.

Hypothesis two seek to determine the business viability of Covid-19 vaccine production. The hypothesis will be tested using result of multiple regressions of all possible factors in the relationship between Covid-19 vaccine production and profitability.

Decision Rule

Hypothesis will be validated on the basis of the p-value of the coefficient as compared against alpha 0.05 (95% confidence interval). If p -value < 0.05, we reject the null hypothesis and accept the alternative if otherwise, we accept the alternative and reject the null hypothesis.

The result of the multiple regressions is presented in the table below

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.988[a]	.975	.975	.700

a. Predictors: (Constant), profitability, Vaccine production

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7669.631	5	1533.926	3134.579	.000[b]
	Residual	192.806	394	.489		
	Total	7862.438	399			

a. Dependent Variable: Profitability, high demands of vaccines, global acceptance of vaccine
b. Predictors: (Constant),

Coefficients[a]

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.418	.140		-2.989	.003
	High demands of vaccine	.365	.144	.087	2.541	.011

Coefficients[a]					
Model	**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
Global acceptance					
Profitability	.552	.141	.123	3.910	.000
Effectiveness of vaccines	.330	.075	.052	4.408	.000
	1.879	.141	.394	13.313	.000
	2.012	.142	.376	14.123	.000
a. Dependent Variable: Profitability					

The result indicate that there is significant relationship between the dependent variable profitability and independent variable (Covid-19 vaccine production) p<0.05. from the model summary, R=0,988, R2=0.975, adj R2=0.975 and p-value= 0.000(<0.05). This implies that 97% variation in profitability is accounted for by changes in the independent variables. The global demand for covid-19 vaccine significantly affects the profitability as the p-value 0.011 is less than 0.05(5% level). Using the decision rule, since P 0.011<0.05, we reject the null hypothesis and accept the alternative that there is significant and positive relationship between Covid-19 vaccine production and profitability.

4.3.4 Test of Hypothesis Three

Hypothesis Three

H1: Entrepreneurial innovation made Covid-19 vaccines possible

This hypothesis will be tested using the result of the linear regression between Entrepreneurial innovation and Covid-19 vaccines possibility.

From the result, Entrepreneurial innovation has a positive and significant (P<0.05) relationship with Covid-19 vaccine possibility as the coefficient of determination R^2 0. 951 indicate that 95% change in entrepreneurial innovation is accounted for by variation in level of covid-19 vaccine. The beta co-efficient value 1.030 revealed that a unit increase in entrepreneurial innovation will bring about more than 10.30% increase in Covid-19 vaccine possibility. Given the P-value 0.000 for entrepreneurial innovation which is less than alpha 0.05 at 95% confidence level, we reject the null hypothesis and accept the alternative hypothesis that Entrepreneurial innovation made Covid-19 vaccines possible.

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.975[a]	.951	.951	.984
a. Predictors: (Constant), Covid-19 vaccine possibility				

ANOVA[a]						
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	Regression	7477.055	1	7477.055	7721.860	.000[b]
	Residual	385.382	398	.968		
	Total	7862.438	399			
a. Dependent Variable: Covid-19 vaccine						
b. Predictors: (Constant), Entrepreneurial innovation						

Coefficients[a]					
Model	**Unstandardized Coefficients**		**Standardized coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
1 (Constant)	.472	.174		2.707	.007
ENTREPRENEURIAL INNOVATION	1.030	.012	.975	87.874	.000
a. Dependent Variable: Covid-19 vaccine possibility					

4.4 Findings of the Study

Based on the data analyzed, the following findings were:

The finding of the study revealed that there is entrepreneurial potential in covid-19 vaccination. Sales of vaccine, production of vaccine and distribution of vaccine are the entrepreneurial potentials in COVID-19 vaccination.

The study also revealed that there is significant and positive relationship between Covid-19 vaccine production and profitability. This is in line with a study recently done by [18]. It was also discovered that entrepreneurial innovation made Covid-19 vaccines possible and a viable business model. High demand of Covid-19 vaccine, global acceptance of the covid-19 vaccine, effectiveness of the vaccine has made Covid-19 vaccine production a viable business.

5. SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDA-TIONS

5.1 Summary

The study was carried out an assessment on entrepreneurial potentials of covid-19 vaccination. The objectives of the study are; to identify entrepreneurial potentials in COVID-19 vaccination, to determine the business viability of Covid-19 production, to ascertain the profitability of Covid-19 vaccination production and distribution and to identify how an entrepreneur can contribute to covid-19 vaccination.

This study used a descriptive research design. The study targeted sixty eight (68) employees of health Centres and hospitals dispensing Covid-19 vaccines in Delta state. The study collected both primary and secondary data. The researcher administered the questionnaire individually to all respondents. Descriptive and content analysis techniques were employed. Descriptive statistics were used to summarize the data. This included simple percentage, mean and standard deviation.

5.2 Conclusion

Based on the findings from the analysis of the data collected for this study, the researcher concludes that Sales of vaccine, production of vaccine and distribution of vaccine are the entrepreneurial potentials in COVID-19 vaccination. The study also concludes that high demand of Covid-19 vaccine, global acceptance of the covid-19 vaccine, effectiveness of the vaccine and no side effect are business viability of Covid-19 production. The study concludes that there is significant and positive relationship between Covid-19 vaccine production and profitability. This is in line with a study recently done by OECD (2021). It was also discovered that entrepreneurial innovation made Covid-19 vaccines possible and a viable business model. High demand of Covid-19 vaccine, global acceptance of the covid-19 vaccine, effectiveness of the vaccine has made Covid-19 vaccine production a viable business.

5.3 Recommendations

On the basis of the findings of this study, the following recommendations were made:

i. The study recommend that government officials should support a more productive interaction and collaboration between them and pharmaceutical firms with a focus on capacity building for entrepreneurship development.
ii. Government should provide fund in form of loan to pharmaceutical firms in other to manufacture covid-19 vaccine.
iii. Pharmaceutical firms should consider the business viability of Covid-19 production and identify the entrepreneurial potentials in COVID-19 vaccination in other to manufacture an effective covid-19 vaccine that will be accepted globally.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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